THE METAL INDUSTRY

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DIE-CASTINGS AND THE MACHINES

By E. F. Lake.*

The die-casting business is one of those that has attempted to do everything in secret, and consequently very little progress has been made with it in the past. It is nearly 35 years ago that patents were taken out on the first machine that die-cast machine parts, these being bearings, and for more than 60 years the same fundamental principles have been used in the machines that cast metal type. The casting machines, die-molds, with their designs and methods of making, and the alloys from which the castings were made, were all kept profoundly secret. The result was that the machines were crude affairs with toggle joints and many levers to pull by hand; the molds were opened and closed slowly; the alloys had a low-melting temperature, and consequently were weak and either soft, brittle or liable to disintegrate. The castings were often porous and spongy in the interior, even though the outer surface was smooth and perfect, and the claims that die-castings were as strong as brass castings could not be made good. Thus die-castings were costly. Another reason for this was that the molds were very expensive, and those wanting castings had to pay for these before any castings could be made. After paying for them, they had to leave the molds in the possession of the die-casting company and could not even see them.

During the past five years this has all been changed, and the machines, methods and processes used are fairly well known or may be learned by those wishing to make a study of the business. Even at that it is almost impossible for a stranger to get into the room where die-castings are being made today, as each firm imagines they have some special methods or machines that are not known. But secrecy in the business is fast disappearing and with it the machine, die-molds and alloys are being perfected so that more castings can be made than was formerly the case, and they are much more perfect. Alloys of a higher melting temperature are used and consequently stronger, harder, tougher and more dense die-castings are being made than were obtainable when secrecy was the rule. This is largely due to the fact that metallurgists, machine designers and mechanics have recently become interested and applied their skill and knowledge to the industry. Today, therefore, we are at the point where brass and bronze die-castings may soon be made a commercial success, and from there to the manufacture of die-castings from steel is not such a great stride. While it may be well to predict what the future will bring forth, it is also well to understand just the status of the industry today. It is not now possible to produce die-castings on a commercial scale from anything but the white metal alloys, except at a price that is prohibitive. Alloys of the white metals and methods of casting them, under pressure, in metal die-molds have been improved, until now it is possible to obtain die-castings that have the strength, toughness, hardness and density of yellow brass castings.

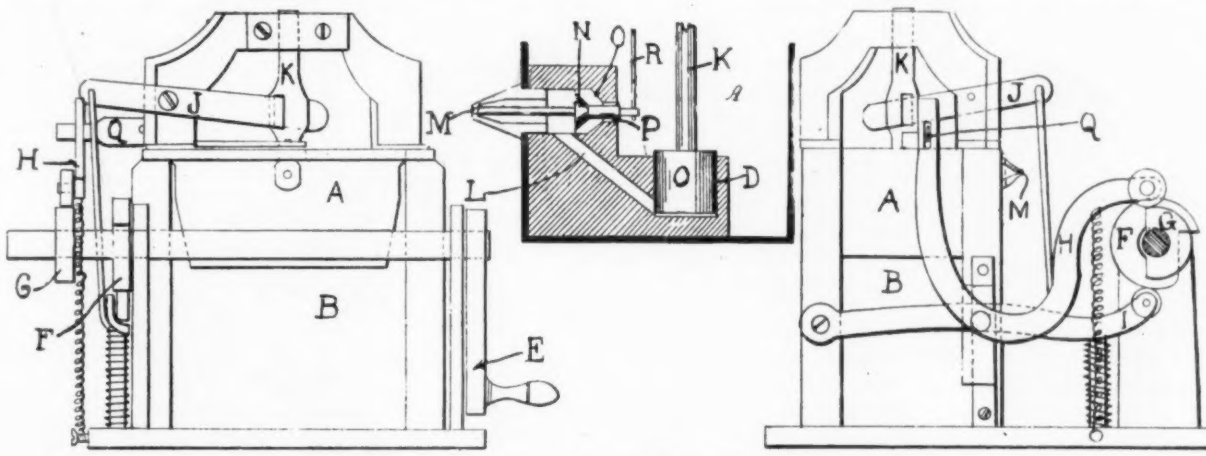


FIG. 1. TYPE-CASTING MACHINE PATENTED IN 1849.

With the same machines and die-molds that cast these white metal alloys, some of the brasses and bronzes can be made into die-casting. Steel die-molds, however, oxidize at a temperature below that which is required to melt brass or bronze, and the iron melting pots that are used in the machine scale off at the higher temperature required. Consequently after 50 or 100 brass die-castings have been made the molds are destroyed to an

*Expert on die molded castings.

extent that will not allow the castings to be made accurate to size. Without this accuracy, which saves all machine work, die-casting is an expensive way of making machine parts. To make 50 or 100 castings and then use new die-molds for the next lot would make these castings much more expensive than they would be, if cast in sand and afterwards machined. The melting pots also being short-lived it adds to the expense. Thus, it will be seen that while brass or bronze castings can be made in the die-casting machines used today and exhibited as samples of what can be done, they cannot be purchased at a price that is within reason.

With all the advancement that has been made, die-castings cannot be obtained from everyone that are as good as the improvements would warrant. Some are still turned out that present a perfect exterior, but have a porous, spongy interior, and very few are making castings that are not filled with small holes which may be seen under the magnifying glass. Such castings have very little strength and have given die-casting a bad reputation in very many places. The homogeneous alloys, from which dense castings may always be made, are

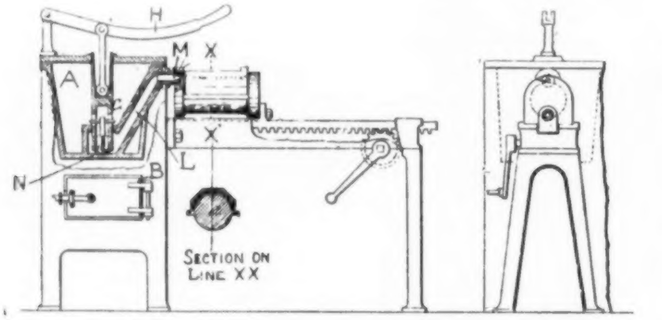


FIG. 2. DUSENBURY BROTHERS' DIE-CASTING MACHINE.

also rarely seen. The castings which have a poor grain structure and are full of miniature air pockets may easily be found by breaking a few castings and examining them with an ordinary magnifying glass. The flaws are then plainly seen and prove the weakness of the metal. If these are compared with castings made by the old method of molding in sand, the difference in grain structure becomes prominent. With die-casting machines of the proper design and materials; die-molds of the correct form and metal, and the use of the proper casting alloys, die-castings can be made that are as dense and have a good grain structure as any of the sand castings.

Another fault that was met with in die-casting alloys, before the metallurgists became interested in the business, was that of disintegration. Alloys were then compounded that would melt easily, flow freely, cast with a smooth surface and have the required hardness. Many of these were strong, hard and tough when first cast, but after being in use for one, two or three years would disintegrate enough to lose a large part of their original strength. The two most prominent examples of the disintegration of metals is shown by alloys made from equal parts of aluminum and nickel, or aluminum and iron. Both of these will be fairly solid when first cast, but within a short time the castings will crumble into powder when left standing in the air. That disintegration is not caused by oxidation is shown by the fact that the powder has the same composition as the casting. One metallurgist claims to have discovered distinct evidence of cellular formation, which may be due to excessive reheating during the process of working the metal or to to crystallation at ordinary temperatures, especially when impurities such as calcium are present. This cellular structure may easily be extended by the action of hard water or other reagents or by mechanical stresses caused by variations in the temperature. Whether these are, or are not, the causes of spontaneous disintegration, the necessity is apparent of making die-casting from alloys or mixtures that will retain their cohesive force, and hence their tensile strength, toughness, hardness, etc. This problem has not been thoroughly understood by many who have endeavored to make die-castings, and thus metals were made into alloys that were greatly weakened by time.

Of the machines that have been used to force the molten metal into the die-molds many different designs have been worked out and different principles used for

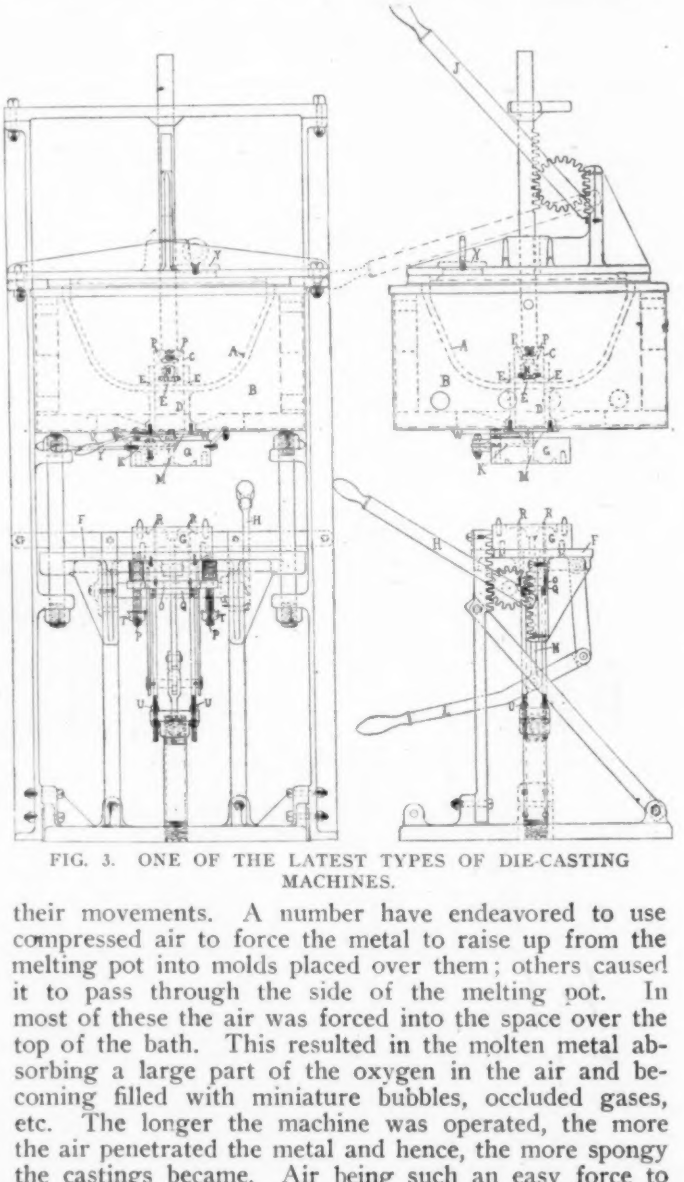


FIG. 3. ONE OF THE LATEST TYPES OF DIE-CASTING MACHINES.

their movements. A number have endeavored to use compressed air to force the metal to raise up from the melting pot into molds placed over them; others caused it to pass through the side of the melting pot. In most of these the air was forced into the space over the top of the bath. This resulted in the molten metal absorbing a large part of the oxygen in the air and becoming filled with miniature bubbles, occluded gases, etc. The longer the machine was operated, the more the air penetrated the metal and hence, the more spongy the castings became. Air being such an easy force to apply and control and the few castings made before the air penetrated the bath, being sound, it was used by those ignorant of its effects. Machines built on these principles were always failures, even though many different designs of machines and die-molds were employed to overcome the absorption of the gases by the alloys.

Centrifugal force was also tried as a method of forcing the metal from the metal pot into the die-molds. None of these have proved successful, owing to the designs being such that the molten metal traveled through

long passages and thus became chilled before it reached the die-molds. Creating a vacuum within the die-molds to draw the molten metal into all corners of it has been successfully used. With this a plunger, operating in a cylinder, is used to force the metal from the melting pot to the mold. When the alloys are properly mixed and melted; the die-molds properly made; the bath of metal kept at the correct temperature; the mold maintained at the required temperature, and the metal forced into it at the necessary pressure, this type of machine will doubtless turn out die-castings as good as they can be produced on a commercial scale. The drawback to this style of machine is its expensive design and the cost of creating a vacuum. If enough castings of one kind are required

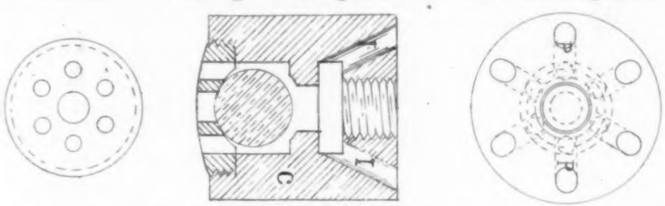


FIG. 4. A PLUNGER WITH AUTOMATIC VALVE FOR A DIE-CASTING MACHINE.

the vacuum machine can be made to operate automatically and castings can then be made cheaper than with hand operated machines.

Most of the successful machines in operation at present omit the vacuum and use the plunger, operating in the cylinder, to force the molten metal into the die-molds under a heavy pressure. They then vent the molds so all air will be excluded by the molten metal as it is forced into the molds. As far back as 1849 a machine of this type was patented in the United States for casting type. This is shown by the three views in Fig. 1. In this machine A is the pot in which the metal for cast-

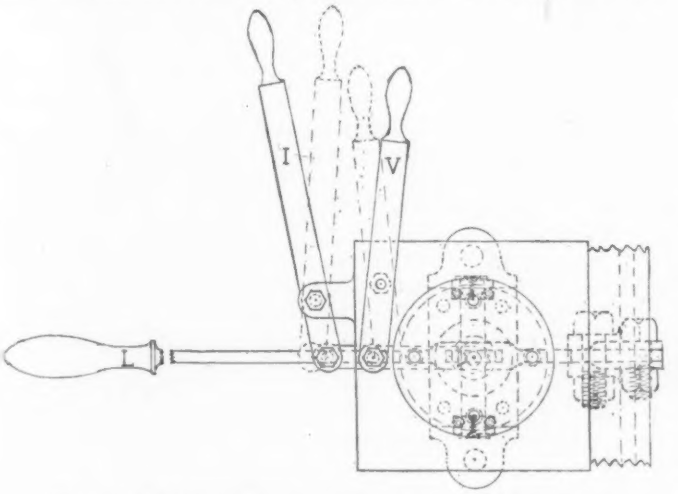


FIG. 5. SHOWING THE SPRUE CUTTER MECHANISM.

ing is melted; B, the furnace underneath for keeping it molten, and C, the plunger that operates in cylinder D. When crank E is turned it operates cams F and G, which in turn operate levers H and I; one end of which rests on these cams. Lever I is connected by a rod to lever J and this to plunger shaft K. Plunger C is thus moved up and down. When plunger C is forced down it squirts the molten metal through passage L and out opening M into the type mold. At the same time valve N is moved back to its seat O to prevent the molten metal from squirting back into the melting pot. As plunger C is drawn up, valve N is moved away from its seat, as shown, and the molten metal is drawn into the cylinder through passages P and L. The motion of valve N is controlled by rod R, levers Q and H, cam G and the shaft on which the cam is located. One of the die-casting firms have retained and developed this cam movement and use it on nearly all of their die-casting machines. Most of the others, however, use the toggle joints which were adopted on machines that were designed later.

The first record we have of machines that were used for casting anything larger or more complicated than type, is the one that was patented by the Dusenberry Brothers in 1877. This is shown in Fig. 2. It was designed for manufacturing machine bearings and used a gear and rack for moving the die-mold away from the casting machines so it could be opened and the casting taken out. The melting pot A and the furnace B are practically the same as in Fig. 1. Plunger C, however, is operated by hand lever H, and valve N is located in the center of plunger C and operates automatically. The molten metal is forced up through passage L and out nozzle M, into the die mold, in practically the same

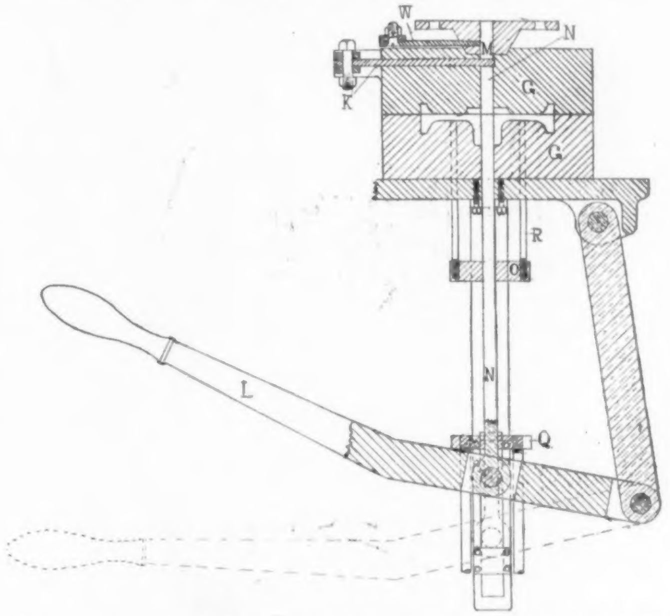


FIG. 6. ANOTHER VIEW OF MACHINE, SHOWING SPRUE CUTTER.

manner as in Fig. 1. An idea of the die-mold and shape of the bearings cast can be obtained by the sectional view on line X, X.

In 1892 C. W. Weiss took out patents on a machine that was practically of the same design as the Dusenberry machine shown in Fig. 2. This machine was given a much wider application as castings of various sizes, shapes and intricacy were made with it. From then until the present time many of the details have been improved and many other patents taken out on various combinations of movements and details.

One of the latest and most improved of the die-casting machines is shown in Fig. 3. In this machine arrangements have been made for cutting off the sprue while it is molten; automatically ejecting the casting from the mold, and for opening and closing the mold with a lever. These additions to the styles shown in Figs. 1 and 2 are adopted by most of the die-casting machines of the present day as they greatly aid in the quick production of casting. In this machine A and B are also the melting pot and furnace and C is the plunger, while D is the cylinder. The valve M is in the shape of a ball and located inside of the plunger, as in the Dusenberry and Weiss machines and others of a later type. The molten metal flows through passages P and passes valve N, when raising the plunger, the same as in earlier types of ma-

chines. To be sure that cylinder D is completely filled with molten metal ports E are provided and gravity causes the metal to flow through these when the plunger is at the top of its stroke. The gear and rack for opening and closing the mold as shown in the Dusenberry machine is used on this later type. The racks have been doubled, however, and the gear used between them so that more power could be obtained with a shorter stroke, and hence a lever used instead of a crank which had to be turned completely around. Improvements in detail such as these enable the die-casting machine of the present day to make more perfect castings and make them enough faster to make the business a much more economical proposition.

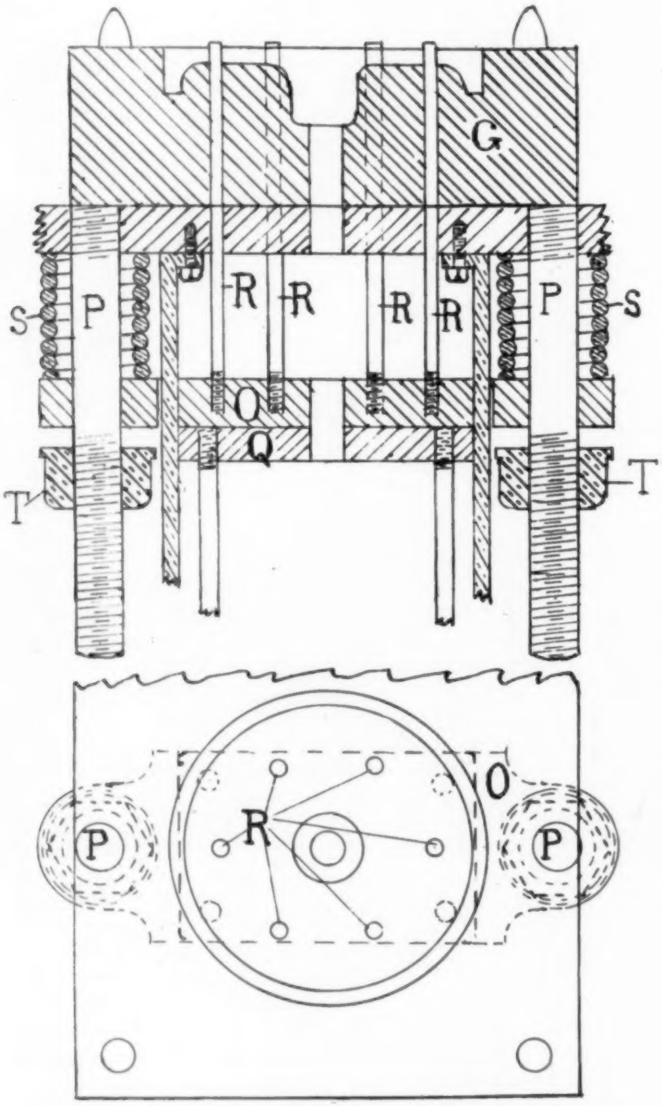


FIG. 7. SHOWING THE CASTING EJECTOR MECHANISM.

In the left-hand view of Fig. 3, the side frame has been left off so as not to add confusion to the working mechanism that operates the machine. To operate it lever H is pulled down and this raises platen F on which is fastened the lower half of die-mold G and this holds it tightly against the upper half of the mold. Lever I is then pushed back into position shown by the dotted lines in Fig. 5, and this opens passage M so the metal can flow into the mold. Lever J, at the top of the machine, is next pulled down to the position shown by the dotted line in Fig. 3, and this brings plunger C to the bottom of its stroke and forces the molten metal into all the corners of the mold to thus make a perfect casting. Lever L is next raised from the position shown in Fig. 3 to the position shown in Fig. 5. This raises the sprue cutter rod N up through the casting and the upper part of die-mold G to the cut-off bar K, which is then moved in by lever I to close up passage M. Lever L is then lowered to pull the sprue cutter out and the die-mold is parted by pulling up on lever H, which lowers platen F and pulls the lower half of the die-mold away from the upper half.

Plate O is attached to the bottom of platen F by rods P and moves up and down on these. When platen F reaches the bottom of its stroke, the movable plate O strikes the stationary plate Q, and this raises casting ejector rods R enough to push the casting out of the die mold. The operation of the casting ejector mechanism is more plainly shown in Fig. 7. When the lower half of die-mold G is raised against its upper half, ready for casting, springs S lower plate O so the ejector rods will come flush with the bottom of the impression cut in the mold for the formation of the casting and thus allow a perfect casting to be made. Nuts T can be moved up and down so as to regulate the lower limit of the stroke of plate O and thus bring the ejector rods to the bottom of the impression no matter how deep it might be cut into the mold. The upper limit of the stroke for the ejector rods R can be regulated by adjusting rods and nuts U and thus raising or lowering plate Q. When it is necessary to take one die-mold off and put another in its place, lever V is pulled out to the position shown by the dotted line in Fig. 5, and this causes cut-off bar W to close passage M and thus stop any metal from running out of the melting pot.

This type of machine sets upright on the floor and is the proper right height to be operated by a man or full-grown boy. It has a melting pot inserted in a clay-lined furnace that is provided with burners of sufficient capacity to give more than the desired temperature. Thus any kind of alloys can be melted down in the melting pot. As large or as small castings as it is practical to make can be made with this machine, as the bottom of the furnace and also platen F are free to take any size die-mold required. It can easily be operated by one person and by putting an ingot of metal into the melting pot ocasionally it can be kept continually filled. Lid Y fills a hole in the melting pot cover and through this the ingot can be put. When the operator has let go of lever H the casting has been ejected from the mold and he is then free to take it away. This represents one of the latest designs of hand-operated machines. It might be belt-driven by the addition of a little different mechanism, and it could be made a vacuum machine by changing the design enough to enclose the two halves of the die-mold, and connect this enclosure with a vacuum pump.

HUGE SODA DEPOSITS IN EAST AFRICA.

[From United States Consul Edwin N. Gunsaulus, Johannesburg.]

Word has reached here from London that underwriting arrangements are proceeding with a view to the early flotation of a company to deal with the immense deposits of the famous Soda Lake at Magadi, in East Africa. It is stated that the capitalization of the company will be about $5,000,000. The Government is said to be prepared to co-operate with the company by extending the Uganda Railway to the lake. Engineers estimate the deposits at 200,000,000 tons.

The lake is described as a few inches of reddish water covering a bottom resembling pink marble, the whole forming an area of at least 20 sq. miles, covered with a deposit of solid soda.

HINTS ON BRASS FOUNDING

By W. R. Dean.

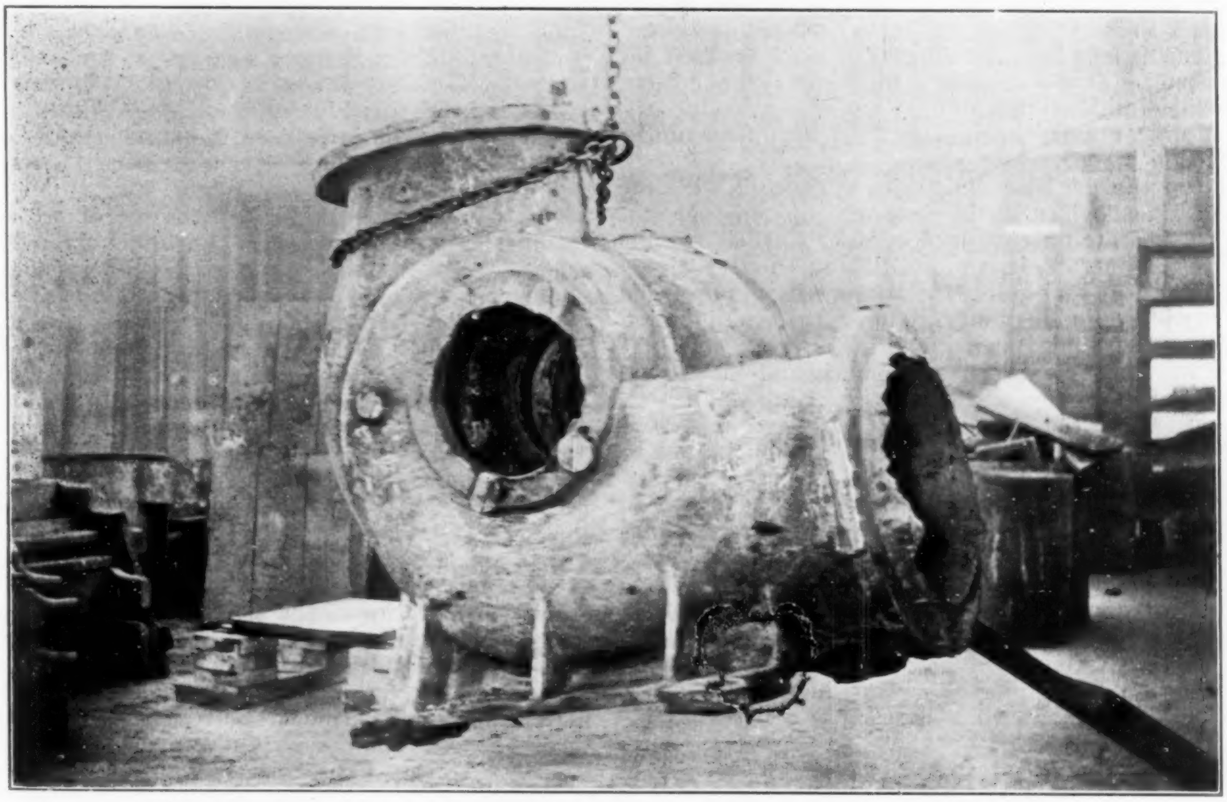
(Continued from January.)

THE ZINC GROUP.

The zinc group is the next one, composed of zinc, cadmium and magnesium. Zinc commonly known as spelter is the most important of the metals used with copper to form alloys. Zinc is used in all proportions from 1 to 43 per cent., more than 43 per cent. makes a hard alloy and no stronger than cast iron, it is useful only in ornaments, at 43 per cent. and over the alloy has a golden color. After the proportion of 66 per cent. copper, 33 per cent. zinc, aluminum should be used, for without aluminum the alloy will be dirty and stogy in appearance and full of oxide or gas holes. The aluminum acts as a deoxidizer and purifies the metal, making it possible to cast the alloy with a larger per cent. of zinc than otherwise would be possible. Ordinary zinc is hard and brittle at ordinary temperatures, while pure zinc is more malleable.

The chief impurities of zinc are lead, iron and arsenic. Zinc readily absorbs oxygen when melted, forming zinc oxide. When zinc is added to the copper bath, if the copper is overheated, the zinc passes off with a great shower of zinc oxide, the zinc taking up and uniting with the oxygen absorbed by the copper. This shows a large per cent. of loss. The zinc should be added before the copper is overheated and thoroughly stirred and then there is only a small loss of zinc. In remelting alloys heavy with zinc a small amount, about 1 to 2 per cent. of the total weight of metal should be added to take the place of the zinc burnt out. Cadmium, like bismuth, is used to make a fusible alloy with a very low melting point. Magnesium possesses great tensile strength, being nearly equal to aluminum bronze. It is a very light metal, being lighter than aluminum. It has the greatest affinity for oxygen when heated than any of the metals, and is used like aluminum to absorb the oxygen taken up by the copper or the alloy.

On account of its lightness it is hard to add magnesium to an alloy alone, and to overcome this the magnesium is first alloyed with zinc in some definite proportion and the zinc-magnesium alloy added to the alloy needing purifying. Magnesium, on account of its lightness, is used with aluminum in the making of flying machines. Aluminum is by itself, having no other metals in its group. It is one of the most widely distributed of the elements on the earth, it being found as alumina in the solid crust of the earth in all parts of the world. Aluminum, like magnesium, is a great deoxidizer and is used as such in both the ferrous and non-ferrous metals. The usefulness of aluminum, in making possible sand casting high in zinc, has already been spoken of. Aluminum is very useful in making manganese bronze.



A LARGE BRONZE PUMP CASING.

A bronze casting weighing in the neighborhood of 3,600 pounds, made by The Atkinson Company, Successors to Clum & Atkinson, brass founders and manufacturers, Rochester, N. Y. The casting was made for a pump casing to be used in connection with some public work in New York harbor. It is a casing made of bronze to replace an iron one that had been destroyed by corrosion of acid and salt water.

ALLOYS.

When two or more metals are caused permanently to unite the resulting mixture is termed an alloy. The purposes for which metals are alloyed are as numerous as the metals themselves, but, as a rule, the combinations are employed to harden, render more fusible, alter the color, or reduce the cost of production. The well-known class of alloys termed brasses fur-

nish a good illustration of the effect of alloying in different combinations of copper and zinc, producing different colors. When the copper predominates the color is reddish, varing on a greenish yellow shade as the zinc increases in proportion and getting yellow at 2 to 1. As the zinc increases the color becomes golden and finally greenish white as the zinc rises to over 50 per cent. Again, nickel is added to whiten brass, making German silver.

In some cases the tensile strength of an alloy is enormously increased by the addition of another metal, sometimes in very small proportions, the various bronzes may be cited as an example; as the addition of iron to maganese bronze. Then, again, the addition of a second metal is a source of weakness, as the addition of antimony. One might be led to consider that the alloying of two malleable metals would produce a malleable alloy, while in many cases this is undoubtedly true, there are others where the opposite is the case. Thus lead added to gold or manganese bronze, even in small amounts, makes the alloy brittle and weak. The specific gravity of an alloy nearly always differs from the mean specific gravity of the constitutents, sometimes greater and sometimes less. When the density has increased it shows that contraction has occurred and chemical combinations has probably taken place between the components. This is the case with bronze rich in copper, while in similar alloys rich in tin expansion occurs, the specific gravity being less than the mean of the two virgin metals.

One of the greatest difficulties connected with the subject of alloying is the tendency of the constituents to separate on cooling according to their specific gravity. As a rule, it is more difficult to alloy 3 or 4 metals than two—especially when the components differ widely in fusibility, unless the combination forms a true chemical compound. The mixture is kept intact by constant stirring and pouring at the lowest possible temperature to run the casting. Many metals may be united in a melted state and separated completely when cold. A good illustration is in lead and zinc while united, while melted upon cooling they separate completely. If it was not for this fact zinc could be used as a hardener in making common babbits instead of antimony. But as lead and antimony do not separate and as antimony hardens the lead, antimony is used instead of zinc. If copper is added to the lead-antimony mixture a separation takes place, the lead separating, and on breaking the alloy the lead will be found in the center in a solid mass. Hence tin is used in white brasses as a hardener instead of antimony.

MICRO-STRUCTURE OF ALLOYS.

A great deal, lately, has been accomplished by microscopic examination of alloys in regard to their defects, etc. In the chemical laboratory of a brass foundry a microscope is as indespensable as a Bunsen burner. With a microscope the structure can be examined closely and the cause of the weakness noted. The microscope will show if there has been any segregation unnoticeable by the naked eye, it also shows the presence of oxide unnoticeable by the eye which would cause the castings to leak and shows the size of the grain, showing whether the metal is too hard or not. After examination by the microscope a weakness can sometimes be remedied without chemical analysis.

PREPARATION OF ALLOYS.

The mode of procedure in the production of any alloys will be largely influenced by the nature of the metal to be operated upon. Some metals are volatile and readily pass off as vapor when heated a few degrees above their melting point. Others have little tendency to vaporize, and may be raised to high temperature without sensible volatilization. When a volatile metal has to be alloyed with a non-volatile metal and the fusing point of both are approximately the same, combination can be most readily effected by mixing the constituents and melting them together in the same crucible. It is very seldom, however, that this happens, as a general rule, the components of an alloy, one or all of which are volatile, have widely different melting points. In this case it is better to melt the most refractory metal first and add the volatile ones in a solid state. Again an alloy may contain one or more fixed metals and a volatile one, in which case the more volatile one is added after the fixed metal or metals have been fused and raised to a temperature necessary to melt the volatile constituent immediately it is introduced, so that combination may be affected before any serious loss, due to vaporization, has occurred. Union between the components of an alloy is more perfectly secured by constant and thorough stirring.

A thing to be guarded against in the melting of base metals is oxidation. Various plans have been tried to avoid this loss as much as possible, and one of the best things is to keep the surface well covered with carbon in the form of charcoal, this charcoal not only excludes the air from the furnace, but absorbs oxygen from the metal liberated during fusion, forming carbonic oxide CO. Carbonic oxide being a reducing agent absorbs more oxygen, forming carbonic acid, CO_2. Thus, as long as the mixture is covered, the carbonic oxide formed, completely shields the metal from oxidation. It is known that the character of many alloys is altered by repeated melting and that the scrap obtained in working cannot be used again without the addition of a certain quantity of new metal. A given mixture may be employed for the formation of an alloy which is highly malleable, ductile and tenacious, and the scrap from the same alloy when melted several times may be brittle and unworkable, but when a suitable quantity of new metal is added the combination may form an alloy even superior to the original one with regard to its good working properties. The only metal that is an exception to the rule for a time is aluminum bronze, the more the scrap of this alloy is melted the better the metal becomes up to a certain number of times, then the rule holds.

(To be continued.)

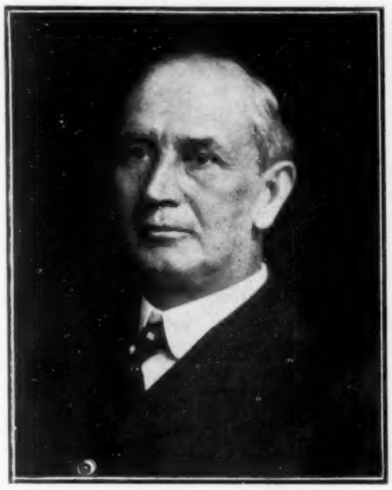
THE LARGEST RADIATOR IN THE WORLD.

United States Consul General T. St. John Gaffney, of Dresden, calls attention to a new radiator intended for the motor of an airship of 300 horsepower. It is made entirely of aluminum, is 4 feet 7 inches high, 4 feet 7 inches broad, and 8 inches deep. These dimensions are small when it is remembered that this radiator, with an hourly capacity of 6,868 gallons, radiates no less than 288,000 calories per hour, while 1,695,000 cubic feet of air pass through it. At an external temperature of 20 degs. C., or 68 degs. F., the maximum internal temperature is 75 degs. C., or 167 degs. F. The weight is trifling, being only 145 pounds empty and 209 pounds when full of water. These figures afford an idea of the development that has taken place in the manufacture of radiators.

DEAN OF THE METAL MEN IN THE UNITED STATES.

C. P. Goss, President of the Scovill Manufacturing Company, of Waterbury, Conn., Completes Fifty Years of Service to the Company.

Chauncey Porter Goss, president of the Scovill Manufacturing Company, of Waterbury, Conn., is probably one of the oldest men "in harness" in the metal industry in the world today, for he has had his golden jubilee, and is now in his fifty-first year in service in the brass, copper and other kindred metal manufacturing industries. His fiftieth anniversary passed on January 15 last, for it was on January 16, 1862, that his connection with the Scovill company began. In that half century he has grown to a power in the local industrial community, and, far beyond his growth the company of which he is the head, has grown to a power among the metal industries of the world. Waterbury, from a straggling mill town, has grown to a populous and progressive city, exciting the admiration and wonder of other New England cities, but Scovill's has developed from a simple plant to a great industrial community, and is probably the largest concern of its kind in the world run in a single great plant.



CHAUNCEY PORTER GOSS.

On January 15, 1862, Mr. Goss became an assistant bookkeeper in the Scovill plant. He was born on August 5, 1838, in Rochester, N. Y. His father was a lawyer of much ability and high standing in that community. He sent his son to the district school in the village of Pittsford, N. Y., to which the family had removed when the lad was but two years old. From the district school C. P. Goss was graduated to a position in the general store of Pittsford, and there he obtained his first business training.

There had been some immigration from New York State towns to Waterbury, Conn., and the prosperity of growing brass and button factories here had begun to be talked of throughout the East and the Atlantic States generally. The young industry to which Mr. Goss came was one of the most thriving, but that meant little, comparatively, as in that epoch the young republic was rapidly forging ahead, and most of its young industries as well as its commercial enterprises were thriving. The young man of the general store in Pittsford wanted to get ahead, and he sought his fortune in the little mill town on the Naugatuck River, not quite twenty-four years old, but with a goodly stock of trading knowledge and a good "business head."

Scovill's was quite some shop at that. It employed 200 hands. There was a rambling wooden mill and a modest office. It got power and water from the river running from the east end of the town, and did a good business because it made buckles and buttons, and they were in great demand then.

Business grew all through the New England States, then the only manufacturing States, and as new inventions came to light and new modes of travel, new ideas in building and a general broadening of national activities and tastes came, Scovill's was found marking time at the threshold of each opportunity, and going forward at the psychological instant. The plant grew. Labor began to be scarce, as farm hands had not yet learned the lure of the mill, and there were few of the fascinations of the modern city to help factory owners to attract them from the plough. The Civil War helped also. The first use of metal plates in the construction of naval vessels started things for the metal makers. Scovill's was not behind, and it produced a goodly amount of goods for the government. At the end of the war it weathered business and financial storms well, and held its own against growing competition. New departments were introduced, experts in various branches of metal manufacturing were secured from famous factories in England to come here and train assistants and improve on British ways, for with all their skill and training few of them failed to improve under the suggestions of Yankee employers.

Mr. Goss figured gradually more and more important as the plant grew and the company's business expanded. He had a wealth of keen business acumen and stood high in the circle of large minds that planned and carried out the company's progressive tactics. He worked in fine harmony with the late Frederick J. Kingsbury, and was his right hand man while he was president of the big corporation. He succeeded him as its president. Before reaching that office, however, he rose, step by step, to secretary in January, 1864, treasurer in 1869, and to the board of directors in 1876, and meantime to the office of treasurer of the Matthews & Willard company, now merged with the Scovill corporation, and finally to general manager. He held that office until 1900, when he succeeded Mr. Kingsbury in the presidency, retaining the office of treasurer also. As Scovill's grew he grew, and his development was thorough and in perfect harmony with that of the business, a fact which undoubtedly counted for much in the success of man and corporation.

Meantime Scovill's products increased in number and variety so rapidly that it was hard to keep track of them, and a catalog today would rival a large encyclopedia if every item were given. The company makes almost everything imaginable in brass goods, copper, bronze and German silverware, cutlery, all kinds of metal machinery, an endless array of novelties, so that it may be said that some of its products may be found in almost all lines of hardware and metal goods. Thousands of parts of products that are finished in other places, trinkets, cans, razors, rollers, wire goods, heavy metal goods, shells, armament, hardware, agricultural tools and parts, coins of gold, silver, nickel, and copper for various nations, and so on, almost *ad infinitum*. All this to show how it has developed in Mr. Goss' time.

Then here are some telling figures. There are now 4,300 names on the company's payroll, as compared with 200 in 1862. The payroll is not only longer but proportionally larger. For the same work for which hands were paid 75 cents to a dollar a day in 1862, the company now pays from $1.25 to $2 and more. Girls who drew 50 cents and upwards in those days, have been succeeded by girls doing the same kinds of work for $1 a day and up to $1.75. Skilled mechanics received wages then that are less than half what their successors make now at the same job. The company then occupied a corner of the old town, less than a city block. Now its buildings extend over several blocks, and in the past fifteen years it has erected new mills at a remarkable rate, investing millions

in development and rearing several handsome five and four-story structures of substantial dimensions and construction and occupying several acres of land surrounding its old limits, which had to be acquired, step by step, with diplomacy and generous regard for its owners and the community alike.

Unlike many growing concerns, its good will seems to have grown simultaneously, as far as the community is concerned, and Waterbury and her citizens are proud of Scovill's and proud of Mr. Goss.

Associated with him now in responsible positions are Mr. Goss' sons, all of whom have gone into the mills from college, and have won the respect and admiration of their father's men by their display of the same democratic spirit and Goss ability.

On his golden anniversary Mr. Goss was at his office as usual, and business went on with slight change, but he paused long enough to hold a reception and shook hands with the hundreds of his employees from various departments, who joined with their superiors in wishing him many happy returns of the day.

REPORT OF AMERICAN BRASS COMPANY.

The American Brass Company has issued its report for the year ended December 31, 1911. The combined net profits of the subsidiary companies compare as follows:

	1911	1910	1909	1908
Net profits	$1,445,542	$1,887,004	$1,767,547	$1,037,518

The balance sheet of the American Brass Company, as of December 31, 1911, compares as follows:

ASSETS.	1911	1910	1909	1908
Cash	$89,900	$58,644	$27,626	$4,980
Due from subsidiaries	2,379,756	2,304,756	2,344,756	2,333,756
Acc'ts received .	255,465	140,503	59,399	19,079
Real estate	37,950	......	......	......
Inventory B B Co.	......	......	108,162	168,162
Stocks of subsidiary co.s ..	12,557,480	12,525,080	12,500,080	12,500,080
Total	$15,220,552	$15,028,984	$15,040,023	$15,026,057
LIABILITIES.				
Cap. stock	$15,000,000	$15,000,000	$15,000,000	$15,000,000
Surplus	220,552	28,984	40,023	26,057
Total	$15,220,552	$15,028,984	$15,040,023	$15,026,057

The combined balance sheet of the subsidiary properties in the American Brass Company, as of January 1, 1912 and 1911, follows:

ASSETS.	1912	1911
*Real estate, machinery, tools, etc...	$9,057,723	$9,203,297
Cash	841,578	902,924
Accounts receivable	4,101,688	3,976,374
Bills receivable	500,826	421,819
Stocks owned in other companies....	3,137,055	3,135,650
Patents	1,000	1,000
Merchandise, raw, wrought, and in process	5,216,885	5,154,278
Total	$22,856,756	$22,795,345
LIABILITIES.		
Capital stock	$5,550,000	$5,550,000
Current accounts and bills payable...	1,222,724	1,689,856
Loans from parent company.........	2,379,756	2,304,756
Surplus	12,704,275	12,250,732
Reserved for contingencies	1,000,000	1,000,000
Total	$22,856,756	$22,795,345

*After crediting $354,425 spent for permanent improvements in 1911, and $520,883 in 1910, and after deducting $500,000 for depreciation in both years.

THE ALUMINUM NOVELTY BUSINESS.

By Joseph Koenig.

The aluminum novelty business seems to be at a standstill as far as the development of new forms and designs are concerned. Very few new goods that would be called novelties are now being brought out, the erstwhile manufacturers of the novelties have followed these goods with the staple lines, without bringing out many new articles. Of course these goods are not now a novelty as they were once, simply because they were made of aluminum. This part of the novelty has disappeared forever. It is now necessary that new forms, new constructions and new applications, as to the uses, be produced and developed, and this part of the novelty line has not progressed of late.

The inventor does not seem to pay much attention to the novelty business and what new things are produced by inventors are in the main so crude and impractical that the manufacturer cannot adopt them. There is really not so much invention needed as there is skillful designing, and in designing we fall woefully behind our German competitors in variety and taste, not especially in the aluminum goods line, but in all metal lines. The designer of a novelty should not only have artistic taste and culture, but he must also know the practical side of the use to which the article is to be put, in order that he may fulfill his aspirations and make his ideas a success; but in this we are lacking.

A good many goods introduced formerly as novelties have now become staple, and most of the work turned out in the aluminum factories is on staple lines. House numbers, salt and pepper shakers, cups and household goods, are no longer considered novelties although there is plenty of opportunity for novelties in that field. The former novelties, such as puff boxes, match safes, picture frames, etc., have lost their charm in the forms produced, and it takes new designs to keep up interest in them.

A great encouragement to produce new shapes and designs would be a law or court ruling that an original design placed on the market could not be copied by another manufacturer, which could be regarded as unfair competition. This would give the designer and originator a chance to get new things on the market and establish an individuality, which at present is not possible. No one wants to spend fifty to a hundred dollars every time that a new thought strikes him for patents, at least not until he sees that the article meets with a ready sale and then it is too late to get protection.

The aluminum novelty business now needs the small manufacturer with sufficient originality and practical sense to develop new lines and shapes. The advertising novelties, especially, are in need of this new inspiration. This line can only be kept up by a total change each year. Aluminum signs, pocket pieces, and other personal wares need reconstruction in order to get them out of the present rut.

MONEL METAL.

"Monel" metal is now being made in the form of wire at a cost that permits of favorable comparison with high grade German silver, but the properties of this new wire are of such high order that it should not be confused with numerous white metals of German or nickel silver. Tests have shown this new wire to be as strong as steel wire while it is less corrodible than copper and takes a finish like pure nickel. The electrical tests have shown "Monel" metal wire to have the following properties:

Electrical resistivity, 256 chms. per mil-foot.
(Temp. coefficient .0011 per 1 deg. F.)
Electrical conductivity, 4 per cent. (Copper 100 per cent.)

CHILIAN COPPER SMITHS

By Oswald H. Evans, F. G. S.

From very early times copper has been worked in Chile, in the first instance to a limited extent by the Indians, who managed to extract sufficient metal for their needs by means of adobe furnaces erected upon exposed hill-tops where the wind supplied the necessary blast. In the early days of the Spanish occupation of Peru and Chile, considerable progress was made in metallurgy by the introduction of water-driven devices for grinding ores, and by improved methods of concentrating and amalgamating in the case of the precious metals, but the extraction continued to be very low and the less relatively enormous, while the apparatus employed, though well enough suited to the state of the country, was crude in the extreme.

For centuries the colonial policy of Spain endeavored to close her American possessions to the outside world. Peru, Chile and La Plata were considered merely as sources of wealth for the Spanish crown, and in a hopeless attempt to exclude foreigners from all participation in the benefits of trade with Spanish America, all intercourse with countries other than Spain was prohibited. This policy tended naturally to retard progress of all kinds, and in the province of metallurgy it led to a very curious result. Throughout the whole of the enormous region affected by the restrictive laws, iron was at a premium, and nearly every metal object was fashioned either of copper or of silver.

Iron, on account of its comparative rarity, was more highly esteemed than it deserved to be for certain purposes, and was sometimes made use of in ostentation by the rich for purposes which would have been better effected by copper. This unusual state of affairs persisted right down to the early years of the last century, when the war of Independence finally removed the yoke of Spain and allowed the peoples of the New World to found republican States, open to trade with all countries.

Captain David Porter, an officer of the United States Navy, who cruised in Pacific waters about the year 1816, comments upon this scarcity of iron. He was almost unable to obtain nails for necessary ship repairs at Valparaiso. More curious still, he captured a vessel in which he found all the cannon-balls made of copper and the guns of iron, a preference directly contrary to that existing in other navies of the period. Practically all the domestic articles of metal were either of copper or of silver, and in both these metals the natives showed a considerable degree of expertness in making quite presentable pots and pans with the aid of tools of the most primitive character. The opening of the country to trade stimulated the production of copper, since foreign enterprise and capital flowed in even to excess. The metal began to be exported, first to the markets of India, later on to Europe, but at the same time the influx of European commodities soon killed off the old-fashioned coppersmith. Today he is a rare bird indeed, and his handiwork, when met with at all, is for the curio shop, and even then it is made with European tools.

Thanks to the intense conservatism of the lower orders in Chile, the form of the vessels in common use remains the same, but they are of less massive substance and their foreign origin is evident enough.

The copper utensils formerly most commonly manufactured by the native smiths consisted of *"Braseros,"* large pans used to hold burning charcoal, with which to this day most of the cooking is done and the comfortless Chilian houses warmed; *"Paylas,"* which are big shallow pans used for a variety of purposes; *"Calderas,"* small jug-shaped vessels used for boiling water, and other similar articles which the few and simple needs of a partially civilized people demanded. Their most ambitious efforts were expended in the making of the large copper pans used for soap boiling, or for treating wine residues preparatory to the distillation of ardent spirit and these were simply *"paylas"* of greater size than usual. The method of manufacture was very simple, and the tools in use few. A mass of bronze served as an anvil, lashed with hide to a tree stump; a pair of hide bellows, worked alternately by hand, supplied the blast, but, properly speaking, force there was none. In making a *"payla"* a shallow mold of baked clay was prepared, placed in a pit in the ground and charcoal heaped over it. When the fire, urged by the bellows was considered hot enough, more charcoal and lumps of copper were fed on, and thus bit by bit the mold was filled with a flat cake of copper. This copper cake was then put on the anvil and roughly beaten into shape with curously shaped hammers with very long heads and

SHOWING HOW THE CHILIAN COPPERSMITHS MANUFACTURED COPPER AND METAL UTENSILS.

*The illustrations are after John Miers (1826), somewhat modified.

short handles, several men working together on a piece of any size, the copper being frequently annealed in a hot fire made in the same pit which served for the melting and casting. When, as usually happened some unlucky blow cracked the pan, it was philosophically patched up again with solder. Some of the smaller utensils were tinned or pewtered inside, but little or no attempt was made to decorate them or to depart from the shape headed down through generations. On the other hand, the curious perforated spoons, used in Maté drinking, and made of silver, copper or brass, are frequently quite ornate. For forming the deeper vessels they made use of a curious support, consisting of the forked branch of a tree, crossed by a transverse bar, upon which a beaked iron bar rested. The metal-worker sat upon the whole apparatus, steadying it with his knees whilst hammering up the utensil into shape.

In common with other Chilian arts the copper work shows Moorish influence, for it is to be noted that the country was first colonized by the Spaniards not long after the expulsion of the Moors from Spain, and Moorish habits and customs, then prevalent throughout Spain but now lost, seem to have survived to some extent in remote Spanish America. Be this as it may, the old order in Chile is rapidly changing, and it would now be no easy task to find a workshop fitted in so primitive a manner as the one here described.

SANITARY EQUIPMENT OF A MODERN BRASS MANUFACTURING PLANT

By Peter W. Blair.*

Sanitary equipment for brass manufacturing plants is beginning to be an interesting matter for the manufacturer, owing to the stringent factory laws adopted and put in force in the different States by the legislatures in the past five years. The manufacturer is also realizing the benefits he can derive from his employees by a larger production of goods through the installation of a complete sanitary equipment placed in his plant so that it saves time and keeps his employees in the best of health. Sanitary equipment is sometimes placed so inconveniently that it wastes time. The best fittings and equipment properly placed are not only more healthful but more economical because they are an incentive to the workmen in the spirit that the employer is looking after their welfare by the introduction and expense he has gone to for the installation of same.

FIG. 1. TOILET ROOM EQUIPMENT IN THE POLISHING DEPARTMENT OF THE H. MUELLER MANUFACTURING COMPANY, DECATUR, ILL. INSTALLED BY THE IDEAL MANUFACTURING COMPANY, DETROIT, MICH.

In one of the large brass manufacturing plants that has come under my observation, they utilized the basement of a three-story building for locker and toilet conveniences. When they decided to locate their toilet and shower baths there, they found that the floor level of the basement was on a level with the sewer in the street, making it impossible to place the plumbing on the ground level. The basement being high enough so that a cement floor two feet above the level of the basement was laid, and all sanitary fixtures were installed. In this way the proper pitch for the main waste pipe was secured. It so happened that in this plant the basement location was the best and most convenient one, but not all men in building factories are so lucky, and it is much better to plan ahead, not only for the kind of equipment, but on the arrangement of it with respect to the different departments of the factory. It is here where the architect, plumber and manager of the plant should get together and decide on the location, as convenience is one of the prime requisites of well located sanitary conveniences. Where plumbing installation permits, the more easily accessible such conveniences are the more in keeping they are with the efficient use of time.

One of the most up-to-date sanitary equipped fac-

*Foreman Brass Finishing Department, H. Mueller Manufacturing Company, Decatur, Ill.

tories is the H. Mueller Manufacturing Company of Decatur, Ill. Fig. 1 shows toilet room of the polishing and buffing departments. Fig. 2 shows the shower baths. Both photographs suggest the proper equipment as an aid to working efficiency. Another of the main features in a brass manufacturing plant is your blower and ventilating systems. If you are removing

FIG. 2. SHOWER BATH AT H. MUELLER MANUFACTURING COMPANY'S PLANT. MANUFACTURED BY HOFFMAN & BILLINGS MANUFACTURING COMPANY, MILWAUKEE, WIS.

dust or odors or smoke with blowers, find out how these effect your ventilation. A blower may help greatly or may interfere with your ventilation. See that all blowers carry off what ought to be got rid of and nothing else. Fig. 3 shows a cut of sanitary drink-

FIG. 3. SANITARY DRINKING FOUNTAIN. MANUFACTURED BY TRENTON POTTERIES COMPANY, TRENTON, N. J.

ing fountain installed in different departments of a brass manufacturing plant, as per the new State laws that have gone into effect in the past year. As 90 per cent. of the workmen in brass factories use tobacco in a chewing form, all persons using same should be furnished with cuspidors, same to be thoroughly cleaned once every day.

The exposure of brass workers to dust inhalation is only one of a number of specific factors in the trade injurious to health and life, and of these mention may be made of the exposure to fumes and vapors generated in the smelting process.

It has long been known that those who live most of their time out of doors have a decided advantage over those who because of their employment are compelled to spend their working hours in a brass manufacturing plant, and it is an accepted fact of modern sanitary science that measures and methods for the prevention of dust are a first and preliminary essential consideration in rational methods of sanitary reform. All that sanitary science can suggest or that sanitary legislation can suggest or regulate and change should be done for humane reasons to mitigate the needless hardships of the workmen who suffer. I have seen from my own experience the beneficial effect of good exhaust ventilation in connection with all polishing and buffing operations, also the effect of an up-to-date sanitary equipped factory compared to one with a crude sanitary equipment.

GAUGE FOR SHEET ZINC.

It may not be a matter of general knowledge that sheet zinc is measured by a distinct gauge known as the "zinc" gauge. This gauge is as follows:

Gauge No.	Decimal equivalent.	Pounds per square feet.
1	.002	.07
2	.004	.15
3	.006	.22
4	.008	.30
5	.010+	.37
6	.012	.45
7	.014	.52
8	.016	.60
9	.018	.67
10	.020	.75
11	.024	.90
12	.028	1.05
13	.032	1.20
14	.036	1.35
15	.040+	1.50
16	.045	1.68
17	.050	1.87
18	.055	2.06
19	.060	2.25
20	.070	2.62
21	.080	3.00
22	.090	3.37
23	.100+	3.75
24	.125+	4.70
25	.250+	9.40
26	.375+	14.00
27	.500+	18.75
28	1.000+	37.50

EFFECTS OF ANNEALING BRASS.

The effects of various annealing temperatures upon the mechanical properties of cold-tested brass bars of commercial quality have been studied in detail. The best combination of strength and ductility appears to be obtained for annealing temperatures between 600 degs. Cent. and 700 degs. Cent. This is in accordance with the results obtained by previous workers.

It has been shown that the atmosphere of the annealing furnace, whether oxidizing or reducing, does not appear to affect in any well-marked manner the properties of brass.

A NOTE ON THE NOMENCLATURE OF ALLOYS.*

By Walter Rosenhain, B.A., D.Sc.

The object of this note is to draw attention to the confusion which exists at the present time in the nomenclature of alloys. This confusion is so great that unless one is definitely acquainted with the composition and properties of the material sold or described under any given name, that name conveys no indication of the true nature of the alloy—in fact, in some cases the name is definitely misleading. This does not apply so much to the well-known alloys such as "Muntz metal" and "naval brass" and similar alloys, but when an alloy consisting essentially of copper and zinc and containing not more than 0.2 per cent. of manganese is described as "manganese bronze" the need for some reform of nomenclature becomes evident.

The confusion to which reference has just been made is, perhaps, most strongly marked in the copper alloys, where no clear line of demarcation exists between such terms as "brass" and "bronze." The alloys containing copper, zinc, and nickel, some of which are known as "German silver," also represent a group in which much confusion exists. The alloys of aluminum with copper present a similar difficulty; the heavy alloys rich in copper are frequently termed "aluminum bronzes," but if the term "bronze" is taken as implying an alloy consisting principally of copper and tin, this name is misleading when applied to a simple copper-aluminum combination.

It is not proposed in the present paper to lay down any definite proposals for a uniform and systematic nomenclature of even the copper alloys; the plan suggested by the author is rather to appoint a strong committee of representative members of the Institute concerned with the various classes of alloys, and to set them the task of evolving such a system of nomenclature if possible in such a way as to be generally acceptable. In the present note it is merely proposed to put forward certain fundamental suggestions in a tentative way to serve as a basis for discussion; these tentative suggestions will be confined to the alloys of copper in which that element is the chief constituent.

The principle on which the suggested system of nomenclature is based is that of regarding alloys as essentially binary alloys—*i. e.*, as consisting of two metals principally, to which one or more other metals may have been added in certain cases. Each of these groups of fundamental binary alloys should receive a general class-name, the various members of the class being then distinguished by the addition of certain words or syllables to the class-name. For the two most important of these classes general names are already in universal use. The whole class of copper-zinc alloys and their ternary and quaternary derivatives would, on this system, be termed "brasses," while the class of copper-tin alloys and their derivatives would be called "bronzes." The class of alloys having a basis of copper and aluminum is not so readily named, since the term "aluminum bronzes" is inadmissible on the principles suggested above. Perhaps the best course would be to adopt an entirely new name compounded of the words copper and aluminum, or parts of those words, or a word analogous to "brass" and "bronze" might be formed. Similarly, copper-nickel alloys might receive a simple, monosyllabic class-name. On the other hand, if the coining of new class-names is considered undesirable—and there are always grave objections to the coining of new words—the classes of alloys in question might be called by the names of the constituent metals—*i. e.*, cupro-aluminums and cupro-nickels.

For the majority of commercial alloys classification under these groups would be quite simple, since in most of these materials the approximation to one or other of the binary types is fairly definite. Thus "naval brass" would, strictly speaking, become "tin brass," but in such a case the old name would be sufficiently near the systematic name to need no interference. Such an alloy as "aich metal," consisting of 60 per cent. copper, 38.2 per cent. zinc, and 1.8 per cent. iron, would become simply an "iron brass," and brasses containing large proportions of lead would be termed "lead brass." This system is readily applicable to all those alloys which are essentially either brass or bronze (in the sense defined above), with moderate additions of other metals. A more difficult case arises in such an alloy as that, for example, known as "electrum," containing 51.61 per cent. copper, 22.58 per cent. zinc, and 25.81 per cent. nickel. Strictly speaking, this would be a zinc-cupro-nickel, but it might be more convenient to call it a nickel brass. A large number of alloys could be quoted which contain two metals (in addition to copper) in nearly equal proportions, and it would not be an easy task to decide to which of the fundamental binary systems such an alloy belongs, but by considering its properties and possibly its microstructure, its analogy to one or other group might be determined; in any case the system of nomenclature would be elastic enough to allow the alloy to be named by either of its constituents without causing misapprehension.

Having put forward these very tentative suggestions in the hope that a comprehensive and satisfactory system may ultimately be evolved, it remains to touch on one further point.

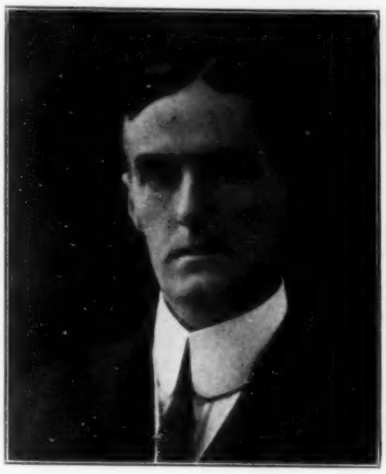
It is obviously outside the scope of this Institute, as it is outside the aims of the present note, to suggest or recommend the suppression of trade names of alloys of special properties, some of which hold the rank of recognized trade names and in some cases even of trade marks. The use of what one may term "fancy" names for the sale, and more particularly for the introduction of novel alloys of special properties is no doubt necessary and useful for commercial purposes. Where such names are purely trade names, not descriptive of the composition of the alloy, their use in no way conflicts with either technical or scientific interests. On the other hand, where such names give what purports to be a description of the alloy by using such terms as "brass" or "bronze" qualified by the name of another metal, then it is essentially in the general interest that such descriptive names should not be misleading. At present there is no recognized system of nomenclature for technical and scientific purposes, and no one can be blamed for applications of these terms which are really inconsistent with one another. The object of the system of nomenclature suggested here, or, rather, the system which it is hoped the Institute of Metals might evolve, would not be to introduce exact technical names into general commercial use so much as to provide the engineer in drawing up his specifications, and the analytical chemist in testing material under those specifications, with a clear and unambiguous set of names by which the general types of alloys could be distinguished. At present there is no unanimity whatever in these matters, and if this Institute could furnish such a basis, the interests of all concerned in alloys would be served.

*Paper read at London meeting of the Institute of Metals, January 16-17, 1912.

RECENT PROGRESS OF "VOLTITE."

A Successful Method of Electro-Plating, or Renovating Worn Metallic Articles by Frictional Precipitation.

By Charles H. Proctor.



ARTHUR T. FIRTH.
Metallurgist and Electro-Chemist.

In the August, 1911, issue of The Metal Industry, I gave in detail an account of "Voltite," the wonderful method of electro-plating metals with gold, silver, nickel, tin, brass or copper by frictional precipitation. The invention of Arthur T. Firth, a chemist and metallurgist, of Auckland, New Zealand, I predicted at that time, that if the preparation was placed upon the American market an unusual demand would be created for it, because the field has been ripe for years for the introduction of a legitimate method of renovating or recoating metallic articles with any of the metals mentioned above. In recent years so many fake plating powders have been placed upon the American market purporting to give a successful deposit of "silver and other metals, that the American public have become very skeptical regarding such claims, because when the application was made to articles to be replated, the deposit was so infinitesimal that the coating was not worthy of the labor expended upon it. Added to these the mercurial solutions, powders, and what we might term ointments which have proven so delusive when applied, that personally I frankly admit that the American public have good reason to be skeptical of the merits of a genuine article of this description, but with the introduction of "Voltite" the American public can rest assured that they will have an article of substantial merit and one that will accomplish all that is claimed for it.

In the Australian colonies, the compound is in great demand. It has proven to be a successful commercial article, having passed the skeptical and experimental stage, and if the demand for the article should reach anywhere near that credited to it in the Australian Colonies according to the output reported by the Voltite Company, Limited, of Auckland, it will require at least twenty million tins of the material to supply the demand of the American public. Mr. Firth and Mr. Holmes C. Walton arrived in New York from New Zealand in the early part of January, representing the Voltite Company of Auckland. They are at present maturing plans for the formation of a large company with sufficient capital to manufacture and place "Voltite" on the markets of the world. Chemists, metallurgists, scientific men and practical electro-platers have proclaimed Voltite a wonderful discovery after having seen practical demonstrations made with it. On January 10, through the courtesy of Professor Tucker, of Columbia University, New York City, a visit was made to the University by Mr. Firth, Mr. Walton and the writer and practical demonstrations were given in the laboratory. The first experiment consisted of coating strips of sheet zinc with silver, the manipulation was carried on from three to five minutes to prove that the thickness of the deposit of silver claimed was actually on the zinc. The zinc was immersed in a fifty per cent. solution of hydrochloric acid and water, the action causing a reduction of all the metallic zinc to a chloride in solution leaving the silver in the form of a foil. The deposit would probably approximate one ounce troy of silver per square foot of surface. Electrically the amount of silver deposit would equal an immersion by the regular method of silver plating in a bath for not less than four to five hours.

The next experiment consisted of depositing twenty-two karat gold upon sheet zinc. This experiment was equally as successful as the previous experiment. The metallic zinc was reduced by a solution of nitric acid, forming nitrate of zinc in solution and the gold was left intact in the form of a foil equal in thickness to the deposit of silver. Experiments were then made with nickel upon brass and copper, with gold and silver upon steel. The surface of the metals deposited were polished and then the base metal was bent and distorted to see if the deposit was adherent, all of which experiments gave successful results. At the conclusion Professor Tucker expressed himself as being extremely gratified with the results and congratulated Mr. Firth upon his invention. The experiments prove without a doubt that "Voltite" is not a laboratory experiment, but a highly successful method of coating and renovating metals so simple in its application that a child can apply it.

The compond in itself is a practical electro-plating outfit, with the addition of water, which is its natural solvent, and the slight friction used in applying it forms a voltaic action exactly as occurs in the electro-depositing bath by the aid of the various salts and the energy created by an electro-dynamo or battery. The metallic powder forms the anode and the article upon which the metal is to be deposited forms the cathode. The addition of the moisture and friction develops hydrogen, which produces a reduction of the salt to a metallic state upon the article itself. This completes the couple and practically gives the same results as in the regular method of electro-plating. The Hotel Astor, New York City, has experimented with "Voltite" to determine its practical utility in re-plating knives, forks, spoons and other articles that are in constant daily use. The chief engineer's report is that Voltite gives perfect satisfaction. The hotels of the country will eventually all use Voltite and this will create a great demand for the product. Voltite will be used by railroads, steamship companies, owners of automobiles, yachts, motor boats, golf clubs, cafes, household use, upon business signs, in banks, department houses and wherever metal articles are in use and become worn

The public have already become interested in Voltite to the extent that letters are being received every day inquiring where Voltite may be purchased or when it will be placed upon the market.

The Voltite process of plating has been brought to the attention of Dr. Joseph W. Richards, professor of metallurgy, Lehigh University, South Bethlehem, Pa., and he has given Mr. Firth quite a flattering report as to what he thinks of the process and the results of tests made by him in his private laboratory. Among other things the professor says:

"The deposit of metal is formed very rapidly, a few seconds after applying water and the powder, and rubbing gently. This is important as facilitating its practical

use. The deposited metals adhere tightly, and, in fact, in time seem to partly penetrate the metal and therefore adhere all the tighter. The deposit as first formed, by gentle rubbing, is bright, and stands burnishing to a brilliant polish. The deposit of silver appears sensibly harder than the ordinary electro-deposited silver. This would result in a deposit of a given thickness wearing longer than an electro-deposit of silver of the same thickness. This is also of practical importance for the use and durability of the plating. It is noteworthy that the silver powder deposits silver upon metallic silver, which would indicate that silver plating could be thus put on to any desired weight or thickness. The same thing is true of practically any metal that is desired to deposit."

EFFECT OF ELECTRIC CURRENT ON CYANIDE SOLUTIONS AND A SIMPLE WAY FOR THEIR PREPARATION*

By M. G. Weber,†

As cyanide solutions give usually a brighter and denser deposit than acid baths and can be employed in almost every case, whereas acid solutions have but a limited field, they are in use in nearly every plating shop. When one passes an electric current through solutions containing a double cyanide, for instance, double cyanide of copper and sodium, $Cu\,Na\,(CN)_2$—I mention sodium and not potassium, as sodium cyanide is cheaper and more efficient than the potassium salt—this salt is separated into two parts, the cathion (Na) and the anion $Cu\,(CN)_2$. If the current density is not too high and the copper salt is present in suitable concentration (about four ounces of metal per gallon), the cathion will act with a reducing effect on the double cyanide of copper and sodium and turn out the copper on the cathode, as per the following equation:

$$Cu\,CN\,NaCN + Na = Cu + 2\,NaCN.$$

We do not see, then, any hydrogen gas developed, but free cyanide of sodium being formed. On the anode an oxidation takes place—the primary anion $Cu\,(CN)_2$ combines with the anode copper to form the single cyanide.

$$Cu\,(CN)_2 + Cu = 2\,CuCN.$$

Cuprous cyanide is only soluble in cyanide solution, and the anode becomes covered with a dirty green mud offering quite a resistance to the current, unless free cyanide is present. We understand, therefore, that the cyanide being formed at the cathode is absolutely necessary to keep the bath in the proper working condition. In order to bring the free cyanide from the cathode quickly together with cuprous cyanide on the anode, it is of advantage to stir the solution and also to heat it up, as in this way the diffusion will be considerably increased.

In case the current density on the cathode is too high, which can be perceived from an intense bubbling up of gas, the sodium no longer acts with a reducing effect, but is discharged and forms with the water of the bath sodium hydrate and hydrogen. The free cyanide is, therefore, lost, and this is the reason why cuprous cyanide on the anode cannot be entirely dissolved; a sludge will remain dropping to the bottom of the tank. In order to bring this mud in solution, as is necessary to prevent the electrolyte from becoming impoverished in metal, sodium cyanide should be added. By using too high a current density on the anode, molecular cupric cyanide is set free, which combines with water to basic cupric cyanide, forming a green mud. The process is carried out as follows:

$$Cu\,(CN)_2 + H_2O = Cu\begin{matrix} \diagup OH \\ \diagdown CN \end{matrix} + HCN.$$

This hydrocyanic acid becomes polymerized and forms an insulating, cocoa colored film, which adheres to the anode. The addition of cyanide will bring this compound into solution.

In order to facilitate the dissolving of the anode metal and the secondary deposition at the cathode, we add so-called conducting salts to the bath. If sodium sulphate, for instance, is used, the cathion (Na) decomposes the copper sodium cyanide, copper being deposited, and simultaneously sodium cyanide is formed. The anion, *e. g.*, SO_4, acts on the double cyanide in a known manner, and cupric cyanide will result, which dissolves the anode metal. It is interesting to note the conditions of voltage and current density, which are required for cyanide solutions; for example, we take a copper cyanide solution again. The ordinary voltage for a solution of this kind in a cold stage ranges between three and five volts. If, however, we use a hot bath, say from 170 to 180 degs. F. in connection with a moderate current density and agitate it well, we need no more than one volt. The current density for cold solution is about three to four amperes per square foot, whereas using hot, well stirred electrolyte, we are able to go up to 20 to 30 amperes, and still obtain a first-class deposit.

The preparation of cyanide baths, according to older recipes, as, for example, that of Roseleur, is rather complicated. The chemicals must be pure and must be mixed carefully, in definite proportions and in a certain order of succession. It is difficult to be sure of the purity of the chemicals, and we all know how easy it is to make mistakes in weighing and mixing. Furthermore, one has to bear in mind that much time is lost in making the solution ready for use, especially for gold and silver plating, where most people start with the metal. The fumes given off in the preparation of solutions are disagreeable and dangerous.

All these difficulties and troubles are obviated by the use of some new products, which are sold under the name "Trisalytes." They combine in one salt all the necessary ingredients for plating baths; that is, an alkali cyanide, a cyanide of the metal to be deposited and a conducting salt. The metal contents of these Trisalytes are always constant and in order to make up a plating bath, it is only necessary to dissolve one of them in water. Voltage, current density and all other conditions remain just the same as in baths prepared after the old method. By making baths with Trisalytes, fumes and poisonous gases are avoided; also there is absolutely no chlorine present, which has such a destructive corrosive action on the hooks on which the anode plates are fastened. The Trisalytes baths have a further advantage—that is, a longer life. They contain only the necessary ingredients required for electro-plating, and no unnecessary salts are introduced, as, for instance, when copper or zinc carbonate are first converted into copper and zinc cyanide by the use of alkali cyanide with the formation of soda. It will therefore be easily understood why the baths can be readily revived by the addition of Trisalytes. With all these advantages, the Trisalytes are bound to facilitate, expedite and improve the work of the plater.

*Paper read at National Electro-Platers banquet, February 10, 1912.

†Works Manager, Roessler & Hasslacher Chemical Company, Perth Amboy, N. J.

GALVANIZING*

A Description of Some of the Latest Improvements in Cold Electro-Galvanizing Processes.

By Louis Potthoff.†

The coating of iron or steel by dipping them into a bath of molten zinc called "Galvanizing" is far from being a satisfactory process. Such articles as fine tools, springs, screws, wire gauze and similar things cannot be given a coating of zinc by the hot process. It is limited to a small class of articles, the usefulness of which would not be destroyed, or at least affected to a certain extent by the heat necessary to melt the zinc, or by the uneven coating of the metal. Neither is it a reliable protection from rust or oxidation. The coating is of a porous and granular nature and instead of acting as a preventative of rust really helps the corrosion to become more rapid through the electro-chemical action which is caused by the moisture of the atmosphere and the chemicals used. The use of ammonium chloride and the chloride of zinc is unavoidable and the combined salts cause the coating to corrode, in case of mechanical injury, from the inside to the outside, notwithstanding the thickness of the coating given. All threaded material has to be recut, the zinc removed and practically left without any coating; if the material has to be stamped or bent the zinc coat will peel or crack, threads on pipes are cut after same have been galvanized and the bare iron on the threads is exposed having no protection whatever, therefore the thread of the pipe is the weakest part. If this is left unprotected the whole pipe may as well be used without galvanizing as far as the protection against rusting is considered, because if the threads are gone the pipe is useless.

The development and perfecting of the cold, electro-galvanizing process has almost to a great extent replaced the hot galvanizing. The results are more satisfactory and uniform. This has been a gradual growth and the bringing of it into practical usefulness has required a great amount of perseverance and hard work. Within the past five years increased attention has been given to cold zincing or electrolytic galvanizing. This is not a new process, as it had been in successful use a long time before coating all kinds of iron castings, tubes, wire sheets, etc. More particularly, however, has attention been given to this special branch of industry in Germany, Italy, England, Austria and Hungary. In the last named country the researches of Czermay have attracted considerable interest. In government yards, various shipbuilding establishments, tube and wire works the results obtained have been so economical and gratifying to the users that hot galvanizing has been suspended. The results that have been accomplished by Czermay on the theory of neutral baths have been amply confirmed by the splendid work accomplished by Prof. C. F. Burgess, of our own country. They demonstrate that on the one hand electrolytic zinking resists atmospheric and other corroding influences much better than hot galvanizing, while on the other hand the cold process dispenses with the employment of the dross and skinning man and the man who is needed to keep the pots hot all the 24 hours, and further avoids the inevitable loss of pots and metal.

In order to convince parties who were more or less interested in this process, severe tests were made for lengthy periods on pieces of various articles coated by the cold process such as wide variations of temperature, carbonic acid, sulphurous acid and humidity. To make these tests conclusive an atmosphere containing 15 per cent. of carbonic acid (CO_2) and 12 per cent. of sulphuric acid (SO_2) was artificially created, while the greatest proportion of these acids in the ordinary atmosphere does not exceed 0.03 per cent. of CO_2 and 3 per cent. of SO_2 even under the very worst conditions. Cold electro-galvanizing today is a commercial process and all over this country are plants erected for that special purpose. The experimental state has passed with the man who developed the process used by these large concerns and his attention is now being given to the development of mechanical devices which will greatly accelerate the process of deposition. Some of these devices will also be shown and described.

The advantages of the cold process over the hot are many, all of them good, but one which is important is the economy of the process. There is no consuming of large quantities of fuel or the necessity of having a fire 24 hours a day to keep the metal in a molten state. The cold method is always ready and can be put into action at a moment's notice. It is only necessary to use the ordinary precautions of all electro-depositing baths, that of keeping the solution in good working order by the addition of the prepared chemical salts. Then again much less metal is used. In the coating of articles by the hot process relatively large quantities of zinc are consumed on account of the impurity of zinc, if sufficient protection against rusting shall be obtained. The thickness of the coat cannot be regulated as the material is dipped in the molten metal which takes a certain quantity of zinc, and as stated the operation cannot regulate the coating in some instances as for wire, round iron, etc., The material has been wiped when leaving the bath so that a light coat is applied, the thickness of which is similar to that applied by the cold process, but the result is that such material will rust in very short time, where electro-galvanized material having the same thickness of coat has stood the time test very satisfactorily, as proven by experiments and practical tests, which shows that a thin electrolytic deposit of zinc will equally well and even better protect the goods, because of its chemical purity, and that a thin coat applied by the hot process is absolutely unsatisfactory.

Arnold Philip in treating upon this phase of electro-galvanizing writes:

> "Apparently with zinc coatings obtained by the old-fashioned hot galvanizing method the amount of zinc required to protect an iron surface so that it will withstand one minute immersion in the saturated copper sulphate solution of 15 degs. Cent., is about 0.248 ounce avoirdupois per square foot, but owing (especially in the case of wire) to the irregularity of the thickness of the zinc coating, the amount may become as great as 0.4 ounce per square foot, whilst in the case of electro-deposited zinc as little as 0.166 ounce per square foot of surface will afford the same protective effect. The reason of this difference is possibly due to the fact that greater purity of the coating zinc, where electro-deposited, renders local action, and hence corrosion, smaller in the case with less pure zinc employed in the hot galvanizing method."

This proves conclusively that articles coated by electrolytical process are superior to those galvanized by the hot process. The thickness of the coating of zinc by the cold method can be regulated, according to the requirements and depends upon the length of time the material is allowed to remain in the bath. The coating,

*A paper read by George B. Hogaboom at the banquet of the National Electro-Platers' Association, February 10, 1912.

†President, U. S. Electro-Galvanizing Company, Brooklyn, N. Y.

furthermore, does not affect the strength, temper or nature of the material galvanized. It is well known that in electro-plating the success of the operation depends on the adherence of the deposit—it is the absolute test of successful electro-deposition of metal. Cold electro-galvanizing meets this requirement, and Prof. Chas. F. Burgess found that the adherence of the coating deposited

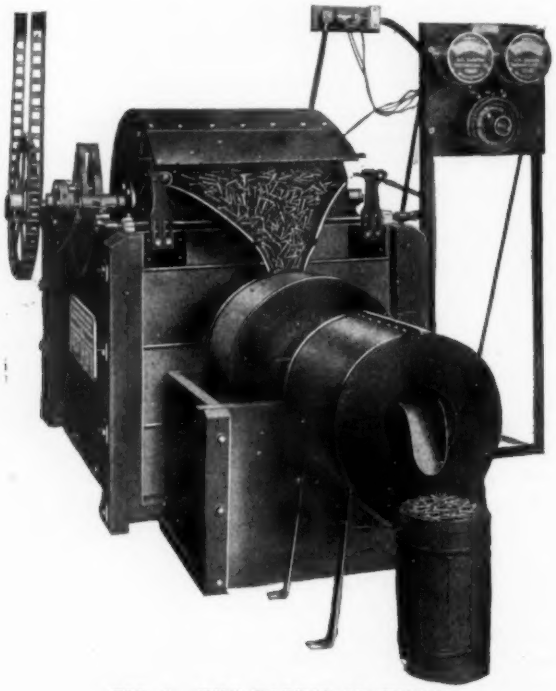
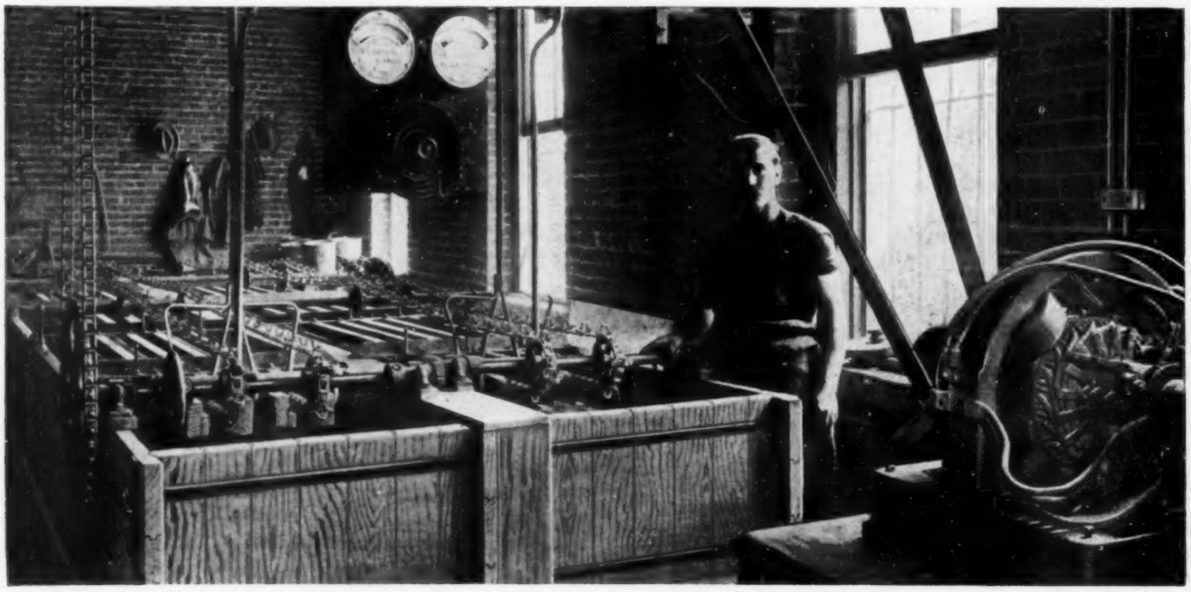


FIG. 1. THE BARREL MACHINE.



CONTINUOUS MACHINE ADAPTED FOR HANDLING SMALL WORK.

from a zinc sulphate solution was 482 pounds per square inch, while that of the coating of hot galvanized plates bought in the local market was 280 pounds. The adherence was determined by soldering to the zinc surface, with low melting solder, a copper plug half an inch in diameter. By noting on a spring balance the pull necessary to separate this plug from the iron a measurement of the adherence of the zinc to the iron is made. The toughness and strength of the coating by the hot process was tested by passing various samples between iron rollers. In some cases the coatings were so brittle as to be cracked off in scales by this treatment, and in other cases the zinc seemed to be pressed into the iron. The electrolytic coating behaved much better than that of the hot process coatings when tested this way.

The class of work which can be galvanized by the cold method is unlimited, nothing is too small or too delicate, nothing is too large. From fine parts of delicate machinery to large steel girders can be given a uniform coating of pure zinc which will resist corrosion.

DESCRIPTION OF DEVICES.

Mechanical devices for electro-plating purposes are fast coming into use. During the past few years great progress has been made in this line. The most important, probably, is the plating and galvanizing barrel. In this line we have excelled and have developed a device which we feel confident that you will say that it is the best machine of its kind upon the market. It has several peculiar, to itself, and individual patented contrivances which make its operation as near perfection as can be had. When developing this barrel we tried to get away from the disagreeable necessity of having to remove the barrel from the tank to empty or refill it. We were most successful. You, who have had experience in operating a plating barrel well know what a sloppy job it is, necessitating the wearing of heavy shoes, rubber aprons, etc., to protect yourself. The bearing of the machine, the floor, the entire surrounding were certain to be splattered with solution which crystallized, and through the evaporation of the acids and chemical salts made very unhealthy conditions.

With the mechanical plating barrel shown here in the illustration, Fig. 1, there are no disagreeable features. Shovel your work in the barrel and when it is finished it is all dry in kegs ready for shipment, no handling of the work, no heavy lifting, etc., the barrel does all your work. In the first place it is well to note that all the bearings, shafting, gears, etc., are completely out of the solution, insuring a steady operation without any unnecessary loss of power. The barrel itself is unique in that it rotates in two directions—in the plating and in the self-emptying direction. When the barrel is running

in the plating direction the work comes in contact with patent cathode rods which are so protected that they are only slightly electro-plated and yet give a perfect contact. They are easily removed and the general practice is to remove them once a month and clean off the deposited metal. When a sufficient coating of metal is produced a lever is shifted, and the barrel begins to rotate in the opposite direction. When it reaches a certain point an attachment, which controls the door of the barrel, is put into action, and the work is automatically ejected into a washing drum which carries it to the *rinsing tank*. With two or three revolutions the barrel is completely emptied and is ready for another load. You will notice that this door works entirely automatically and there is no screwing or unscrewing of any bolts or lag screws.

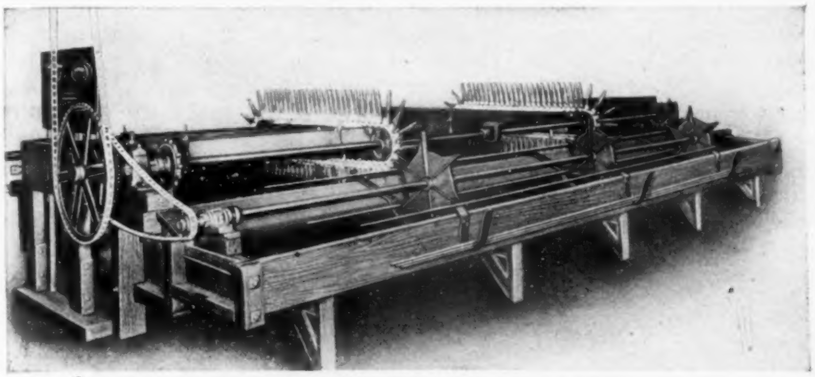


FIG. 2.—MACHINE FOR GALVANIZING TUBES AND BAR IRON.

In the rinsing tank is fresh, clean, running water which is supplied at will. The work being thoroughly rinsed is then delivered, not all at once, but in small lots, to the dryer. A novel feature of this running tank is that, through the use of a special contrivance it reverses its motion when the plating barrel is being emptied and while in this motion does not discharge any of its contents into the dryer until the plating barrel is again run in the plating direction. This gives the advantage of having two operations going on at one time, each independent of the other, that is, while the rinsing and drying one batch is going on, another lot of work is being plated or galvanized in the plating barrel.

The work being delivered from the rinsing tank to the dryer in small quantities affords ample time for the work to become perfectly dry before it is discharged through an automatic device into a keg or any suitable receptacle. This electro-plating device is completeness in itself, three different operations, plating, rinsing, drying working hand in hand, but each distinct, independent of the other, and all working together in absolute harmony. These barrels are manufactured in three different sizes, the smallest one on the premises, 25 inches long by 24 inches in diameter, used mostly for nickel, brass or copper plating, the next size, 36 inches long by 40 inches in diameter, and the largest size, 50 inches long by 40 inches in diameter. The latter sizes are mostly used for electro-galvanizing and handling at a time from 150 to 300 pounds, according to size and kind of material. The latter two barrels are also used for nickel, brass and copper plating for light, bulky material, so as to be able to get sufficient output.

THE BAR IRON AND TUBE TANK.

This, like the plating barrel, is complete in itself, the work going in at one side to be plated and coming out at the other side ready for shipment. It has one added feature, however, and that is that the operation is continuous. It can be carried on 24 hours a day, 30 days a montr, 365 days a year without any interruption. In plating rods or pipes a 30 minute run is quite sufficient for a good protective coating. The tank of the size shown in the illustration, Fig. 2, accommodates 30 rods at a time, and 31 minutes after the first rod has been put into the solution, one is completed every minute. In an ordinary work day 500 pipes or rods ranging from 6 to 30 feet long and from 1/16 inch to 3 inches in diameter can be plated or galvanized.

The special feature of this tank, aside from the patented mechanical devices which keep the work in motion, is the arrangement of the cathode rods. These are placed under the solution and at an angle with the tank. This not only insures perfect connection, but every second the point of contact is being changed so that during the entire operation the cathode rod never touches the same place twice. This eliminates all wire marks, or those of supporting hooks or racks. No wetting of the hands or removing the work to shift the wire is required. The automatic patented conveyor which propels the rods

The plant shown here is a complete jobbing plant installed for the Kansas City Galvanizing & Manufacturing Company in Kansas City, Mo., equipped with patented handling devices; a similar plant has been installed for the Pittsburgh Electro-Galvanizing Company in Pittsburgh, Pa., both plants being in successful operation.

across the tank can be seen in the illustration—they look like long fingers. They are made of special wood treated so as to preserve them. On the side that touches the rod pieces of insulation are inserted so that the wood itself never comes in contact with the work. The fingers slowly propel the work through the solution, keeping the rods or pipes traveling toward the finishing side, at whatever rate of speed the operator desires, the speed regulating the thickness of the coating. They also keep the rods rolling so that the coating of metal is absolutely uniform.

By putting into operation a patented contrivance the anodes of the tanks can be put out of commission and in their place special anodes which plate the inside of the pipes or conduits are connected up. By this arrangement the inside only of the pipes or conduits can be plated, if so required; it is certainly to be understood that the outside only can be coated also, as well as inside and outside in one operation. They are handled otherwise exactly the same as rods with just as much ease. A rinsing and drying apparatus is also connected with this tank, which works automatically, delivering the work ready for shipment. Ordinary, still tanks can be used for electro-galvanizing, but for small work we have devised and patented another labor-saving apparatus, as shown in the illustration, Fig. 2. A peculiarly constructed chain running by a special arrangement is operated on top of the tank. To this chain can be attached work too large for a plating barrel, or too delicate to stand the rumbling, or that would otherwise be hung upon hooks or racks.

The work is hung in at one end of the tank, traveling through same and taken out at the other end finished; from 10,000 to 100,000 pieces can be plated by this device per day, larger single pieces are hung on hooks, smaller pieces on racks, each link of the conveyor chain is provided with a U-shaped hook having extensions on both sides for taking up the current, after the material to be plated or galvanized is placed on hooks or racks, one hook or rack is hung on the chain traveling slowly through the other end of tank, as soon as it is far enough advanced another hook or rack is placed in the tank until the tank is filled up entirely, then about every half minute one piece or filled rack is finished and taken out by a boy and replaced by a boy on the starting end. The output is dependent on length of the tank; each tank can be provided with 1 to 4 conveyors. It can also be arranged that the material is passed, before reaching the plating or galvanizing tank, through a potash and rinsing tank.

The speed is regulated according to the needs of the work, so that a piece of work starting in at one end may be taken out in 15, 20 or 30 minutes, plated just according to requirements. It is well known that work which is kept in motion can be electro-plated with a higher voltage without any danger of burning, and therefore does not have to remain in the solution so long to receive the required deposit. This device keeps the work constantly in motion. Then again work that is kept in motion will not allow the collecting of hydrogen bubbles upon its surface and consequently no pitting of the work results. Pitting of work is unknown in this tank. To go into detail and explain all the workings and advantages of these electro-plating devices is unnecessary at this time. Enough has been said to show you what they are capable of doing. A plating room equipped with them could not only greatly increase its capacity for turning out work, but would be a pleasure to work in, so simple and perfect are these devices in operation.

The plant here shown was installed for the Babcock & Wilcox Company at the recommendation of the Government, for galvanizing plates and angles for boiler cases, the Government stating that they preferred the electro-galvanizing for the reason that, after galvanizing, all faults in the plates will show up, as by the electrolytic process the galvanizing follows the surface, where, by the hot process, all faults are covered. This plant has galvanized heavy plates about 8 to 9 feet wide up to 15 to 18 feet long and ¼ to ½ inch thick.

AMERICAN ABRASIVE MATERIALS.

[Announcement of United States Geological Survey.]

Mention is made in the report of a new artificial abrasive, "corubin," manufactured abroad, which has recently been put on the market. The material is produced from the slag resulting from the reaction between aluminum and chromium oxides. It is practically pure alumina containing a trace of chromium oxide, which gives it a red color. On account of the high temperature at which it is manufactured it is free from combined moisture. It is produced in three grades—coarse, medium and fine—and is sold only in the proportion of two parts coarse to one each of medium and fine.

ON THE BEHAVIOR OF CERTAIN ALLOYS WHEN HEATED IN VACUO*

By Professor Thomas Turner (University of Birmingham, England).

I—EXPERIMENTS ON BRASS.

In some experiments conducted in my laboratory last session, on the gases in brass, by Mr. J. Cartland, M.Sc., it was observed that when brass is melted *in vacuo* the zinc is entirely volatilized and the copper remains behind. This separation is quantitative, provided that the materials employed are pure and that the heating is not at two high a temperature or too prolonged. Otherwise the copper itself may begin to volatilize, though at 1200 degs. C. the loss of copper occurs very slowly. The following are examples of the results obtained:

Sample.		By Analysis. Per cent.	By Loss *in Vacuo*. Per cent.
1.	Percentage in Zinc	36.90	36.80
2.	" "	28.63	28.85

The experiments were performed as follows: A weighed quantity of the brass was placed in a porcelain boat, and introduced into a porcelain tube, the ends of which were then suitably closed, and the tube exhausted till the pressure was less than 5 millimeters of mercury. The tube was heated in an electric tube furnace of the well-known platinum resistance type until it was seen, through the glass cover at the end of the tube, that the metal was melted. By the aid of a thermo-couple placed within the tube of the furnace, but outside the exhausted tube, care was taken that the temperature did not rise more than a few degrees above the melting point of copper. If the alloy is maintained for about half an hour at this temperature, all volatile metals will have been removed from the copper, which, on cooling, is obtained in beautiful prills of a clear red color, and usually with plainly developed crystal surface markings. The zinc condenses in the cooler parts of the tube in crystals which have a perfect metallic luster.

In view of these results the question naturally arose as to what would be the effect of heating *in vacuo* an alloy which contained considerable proportions of other metals in addition to copper and zinc. A sample of impure brass was obviously a suitable material for preliminary investigations.

II—POISONED BRASS.

Occasionally during the past twenty-five years, when visiting brass foundries in the Birmingham district, I have heard the workmen speak of "poisoned" brass. It is described as being a variety of brass which is no good for casting purposes if used alone, and the evil influences of which are manifest in any alloy of which the poisoned material may form a part. The language employed might at first sight suggest some occult or living power in the brass, and recalls the ideas of an Indian writer who, a few years ago, suggested that metals might be living or dead, ill or well, like animals or plants. No such thought is present in the mind of the workman, however, for he uses the word "poisoned" rather to express a property of the material than to suggest any hidden or deeper meaning. The language of the uneducated metal worker is often that of the science of an earlier age. Thus when a puddler calls the blue flame of carbon monoxide "sulphur," he does not suppose that what he would call "brimstone" is really present, but that some volatile and combustible principle is being evolved or produced. In this way he exactly imitates the philosophers who preceded Priestley and Lavoisier, and who constantly employed the term "sulphur" in a similar manner.

*Paper read at London meeting of the Institute of Metals, January 16-17, 1912.

A few years ago a sample of "poisoned" brass was received from Mr. R. H. Best, who regarded it as somewhat of a curiosity, and it was placed in the Metallurgical Museum. It was part of an ingot, nearly semicircular in shape; it was rather light yellow in color, had the sharp fracture of a brittle material, and was full of blowholes, some of which were not much less than a quarter of an inch in diameter. Inquiries as to the source of origin of this sample showed that it was made by melting up the general scrap of a foundry. The makers apparently did not consider it sufficiently good for their own purposes, so sold it at a cheap rate. The blowholes were stated to be due to the use of a damp mold, and this may probably be correct, at least in part.

An analysis of the alloy, conducted in my laboratory by Mr. P. T. Brühl, M.Sc., gave the following results:

	Per Cent.
Copper	72.53
Zinc	11.65
Lead	7.11
Tin	5.52
Iron	2.00
Aluminium	0.75
Arsenic	0.09
Manganese	0.06
Phosphorus	Nil
	99.71

An examination of these figures will fully explain the inferior results which would be obtained on using such an alloy, and would justify the use of the word "poisoned" in the sense in which it is employed by the workmen.

A weighed quantity of this alloy was placed in a porcelain boat and heated *in vacuo* in a porcelain tube to a temperature of about 1,200 degs., as before described.

The residue left in the boat from the poisoned brass was weighed and analyzed by Mr. C. R. Groves, B.Sc., and the results obtained are as follows:

Residue in the boat (by Analysis).

	Per Cent.
Copper	72.36
Tin	5.01
Iron	1.96
Lead	Nil
Zinc	Nil
Arsenic	Nil

Loss by Volatilization.

	Per Cent.
Zinc	11.65
Lead	7.11
Tin	0.51
Arsenic	0.09

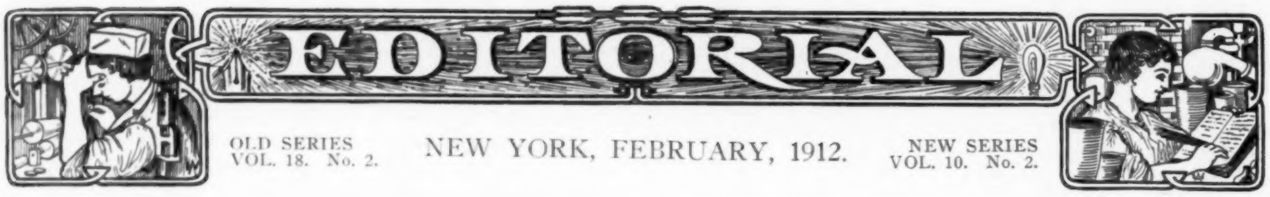
These results account for about 98.69 per cent. of the whole. The aluminum and manganese were not estimated, on account of the small quantity of the material which was available.

It will thus be seen that when zinc and lead are present together in the alloy in certain proportions, the whole of the zinc and lead may be removed by heating to the melting point of copper *in vacuo,* and the two metals are recovered in the metallic state. The loss of arsenic is also significant.

(To be Continued.)

MANUFACTURING PRINCIPLES.

There are three plans of manufacturing brass goods, the unsystematized or "hit or miss," the systematized or "know-where-you-stand," and the scientific management or "know-how-to-get-there-the-best-way." Personality is vital to the successful working of each.



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THE METAL INDUSTRY

With Which are Incorporated

THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

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ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
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CONTENTS

CONVENTION PAPERS

The chairman of the committee on papers for the convention of the American Brass Founders' Association, to be held in Buffalo in June, announces that there are so far ten papers promised. This is good news and we hope that those who are engaged in the preparation of these papers will bear in mind that what makes good literature of the science of foundry practice is a recital of practice coincident or nearly so with theory. Many of the papers presented at previous conventions, while most excellent in their way, may be considered as susceptible to mild criticism. This would mean that they leaned a little bit too far on the practical side or were a mere accounting of some practical experiments. Such papers are all very well by themselves, but it would make them doubly interesting if the theory of the process or processes was worked out at the same time.

A little more of the results of research work continually carried on at our scientific laboratories and institutions of learning, sprinkled in with the papers written by our practical workers would be a most excellent thing. It may be that the foundrymen's association is not as well represented at such institutions as it should be. If this is the case, it is a matter for the secretary and committee on membership to take up. For the purpose of illustrating what we mean, we call attention to the last bound volume of the American Electro-Chemical Society. This is a volume of 500 pages and is the report of the papers read at one meeting only. The paper on "The Effect of Organic and Inorganic Addition Agents upon the Electro-Deposition of Copper from Electrolytes Containing Arsenic" strikes us as being a classic on its subject, and represents a wonderful amount of research work and a careful and painstaking recounting of the result.

These are the kind of papers we should have read in June. If parties capable of and willing to prepare papers would only begin work upon them immediately at the close of each convention we are sure that there would be some extremely valuable contributions to foundry science each year. We hear it whispered that there are to be some really fine papers read in June next and we hope, in this connection, that the secretary will be able to distribute copies of papers far enough in advance of the meeting so that there may be plenty of studied and earnest discussion.

Our sister society, "The Institute of Metals," seems at present to be suffering from just the opposite state of affairs; a dearth of practical papers among the eminently scientific and classical emanations from the university coterie of institute writers. An editorial in the English edition of The Metal Industry for last month rather

severely criticises the papers read at the last meeting of the Institute, held in January in London. It says in part:

It is the old struggle between the practical and the theoretical interests to gain supremacy, without the parties realising that the institute can fulfill no useful purpose unless it serves as an effective medium for harmonising the two interests. On former occasions we have felt constrained to criticise the great preponderance of purely scientific papers at meetings of the institute; but our feelings have been tempered by the hope that as time went on, and as the problems requiring solution became better acquainted, the balance would be equitably adjusted and that we should see the realisation of one of the objects of the institute, namely, "to afford a means of communication between members of the non-ferrous metal trades upon matters bearing upon their respective manufactures." The publication of the programme of papers set down for reading at the annual meeting of January 16 and 17, and reported elsewhere in this issue, completely shattered our hopes, however. Not one of the papers bears any resemblance to practical matters, and as Mr. Walter Robertson pointed, "the meeting seems to be an outlet for the universities to give a resumé of the term's working." Of the eight papers contributed six emanated from colleges, and we might say without disrespect that none of them were of such urgent practical importance to warrant the attention devoted to them by the meeting. We willingly acknowledge the devotion and value of the work of Sir Gerard Muntz and others and of the able secretary, but surely even their warmest admirers cannot profess to be satisfied with the results so far produced. The majority of the members of the institute are practical men, and what they require is information with a view of elucidating mysteries and troubles which have come under their notice in the course of their manufacture or usage of non-ferrous metals, and it is obviously of little use to them to watch the development of the scientific side if it leaves the practical side untouched.

It appears, indeed, that the Institute of Metals is losing the confidence of makers and users of non-ferrous metals, if we may judge from their absence from or silence at meetings of the institute. The latter has certainly done little to establish confidence and interchange of ideas. There is an infinite amount of information yet to be gathered in the production and treatment of metals, but such papers as we have been accustomed to, and as were presented at the January meeting of the institute contain little that can be put to any practical use. Some two years ago, Sir Gerard Muntz, the late president, pleaded for the closer co-operation between the scientific and practical sides. "We must look," he said, "to our scientific members to show us the road, then it will remain for the practical men to make use of the knowledge accumulated, and put it to its proper uses." These words contain the germ of the spirit which should animate the Institute of Metals, but all who have watched its progress, must regretfully have noted how little of that sound advice is transformed into reality by the papers read at the periodical meetings. It is true that we have a wealth of scientific matter presented at these meetings, much of it interesting when its meaning is not obscured by needless verbosity on the part of the authors. But who can assert that the scientific treatises which occupy the attention of meetings and monopolize space in the journal of the institute, bears altogether upon the manufacture, working and use of the non-ferrous metals and their alloys. At meeting after meeting, the same authors appear on the programme, and the usual academic disputations take place between professional combatants. Subjects appear for discussion with wearysome reiteration and without any light breaking in upon the befogged intelligence of the patient few, outside the charmed tutorial circle who have the hardihood to sit through the discussions. Obviously the printed volumes in which these academic papers and their authors are immortalised are soon relegated among dead matter, and one almost sighs for a non-ferrous Andrew Carnegie who will endow libraries for the storage of this class of literature.

Could anything more impractical be imagined than the attempt to crowd into a few hours the reading and discussion of no fewer than eight papers. Yet this is what the Institute of Metals attempted to do at their last meeting. How much more beneficial would it be for the institute to follow the example of its Birmingham section, before which a number of practical papers have been read during the short period of its formation. There is a vast field open for research in regard to non-ferrous metals, and the present available knowledge is but a drop in the ocean. But if the Institute of Metals is to prove useful and successful, it must needs bestir itself on the practical side, and so bring about the happy consummation of the objects which gave rise to its existence.

NEW BOOKS

TRANSACTIONS AMERICAN ELECTROCHEMICAL SOCIETY, Volume XX, 1911. Size 6½ by 9 inches; 500 pages with numerous illustrations. Published by the society, J. W. Richards, secretary.

This book makes a valuable addition to the literature of scientific societies and is a report of the Twentieth Annual meeting of the society which was held in Toronto, Canada, September 21-23, 1911. It includes the proceedings of the twentieth general meeting and a list of members, guests and attendants, and an alphabetical list of the members of the society, which comprises 1,300 names. The balance of the volume is taken up with the papers read at the meeting and their discussion.

"THE COPPER HANDBOOK." Vol. X. By Horace J. Stevens. Size, 9 by 6 inches. 1902 pages, with index. Bound in cloth. Price, $5.00. For sale by THE METAL INDUSTRY. This book is sent on approval, and subject to return after a week's inspection.

The tenth annual edition of the Copper Handbook, which is considered a standard authority on the subject of copper and copper mines for the entire globe, has 1902 octavo pages, containing nearly 1,500,000 words, and, in addition to the miscellaneous chapters, lists and describes 8,130 copper mines and copper mining companies, in all parts of the world, this being the largest number of titles ever listed by any work on mining. The descriptions range from two or three lines, in the case of dead companies, wherein reference is made to detailed descriptions in past volumes at the period of their activity, up to twenty-one pages in the case of the Anaconda mine, which yields one-eighth of all the copper made in the world.

The miscellaneous chapters of the book, twenty-four in number, treat the subject of copper from all possible viewpoints, there being chapters on the history, chemistry, mineralogy, metallurgy, brands and grades, alloys and substitutes for copper, with a copious glossary, and a chapter of statistics ending the book that contains 40-odd tables, thoroughly covering copper production, consumption, movements, prices, dividends.

CRITICISM AND COMMENT

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

ALUMINUM BRONZE

To the Editor of The Metal Industry:

You were kind enough to send me the December number of your journal containing on page 520 an extract of my American Patent No. 1,007,548 concerning alloys of aluminum bronze. On page 516 of the same publication there is an editorial article on this interesting subject of alloys of aluminum bronze, which is entirely erroneous as far as my patent is concerned. The editorial article in question draws attention to the delays which have occurred in the development of these alloys owing to the difficulties encountered in their preparation and the seeming impossibility of getting rid of aluminum oxides spontaneously produced in these alloys. It would appear from your editorial that nothing has been discovered up to the present to enable this oxide of aluminum to be eliminated. This is an error on your part for I have a process which enables me to attain this end, but which I desire to keep secret for the present.

This, however, has nothing whatever to do with my patent No. 1,007,548, and your editorial is entirely in the wrong in connecting this patent in any way whatsoever with the employment of manganese for the purpose of eliminating oxides. On the contrary it is distinctly stated in the patent, and in the extract of it which you publish in the December number of your journal that the action due to the employment of manganese is destined to get rid of certain disturbing elements other than oxides.

Starting, therefore, from wrong premises, and ignoring the fact that it is distinctly stated in the wording of my patent that "manganese has not the power to reduce aluminum oxide or alumina," the writer of your leading article makes criticisms which are absolutely without any foundation. The interesting point in my patent lies precisely in the fact that aluminum oxide is not the only source of trouble in the manufacture of aluminum bronze, and it is evident that as far as the experiments you speak of are concerned this fact has been totally overlooked. There is consequently no doubt that the addition of manganese in certain proportion with or without the elimination of oxide gives an immense superiority over the binary bronzes of copper and aluminum.

The experiments you mention constitute another example of how easy it is to pass over an interesting and important result when looking without success for a totally different one, and to show you that this is so in this case I will refer you to the Proceedings of the Institute of Mechanical Engineers, London, England, January-February, 1910. At the meeting held at this institute on the 21st January, 1910, there was read the ninth report of the alloys research committee concerning "The Properties of Some Alloys of Copper, Aluminum and Manganese," which gave the very interesting details resulting from experiments carried on, concurrently with my own but independently, and which only came to my knowledge from reading the printed report which was published subsequently to the granting of my patent.

These experiments undertaken by well-known scientists under the auspices of a world renowned scientific institution will, I think, bear more weight than those mentioned in your article as having taken place ten years ago in some unmentioned locality by some unmentioned party, and as they bear out in every respect the great value to be attached to my patent, I think it necessary to draw your attention to them in order to refute the unfounded criticisms put forward by the writer of the article in your journal. J. H. G. Durville.

Paris, France, January 5, 1912.

The writer of the article objected to by Mr. Durville merely remarked that the use of manganese was not new to him and he implied a doubt as to the beneficial results in the use of same. It was the writer's experience some ten or more years ago, while engaged in the manufacture of non-ferrous alloys, that the addition of manganese produced no effect which rendered the resulting alloy of copper and aluminum valuable in a commercial sense as a workable alloy. The object at that time was to produce aluminum bronzes for rolling, spinning, turning and other mechanical operations, but the project was finally given up, not because of the inability to produce them, but to do so commercially in large amounts.

In other words, the loss in scrap and shrinkage was too great to carry on the business. It was also stated in the article that as far as we knew nothing had been discovered for the reduction of the oxide of aluminum, and this is so to the extent of our present knowledge. If Mr. Durville has discovered such a process we feel sure that it will work a revolution in the trades that employ aluminum as a constituent of the alloys produced, and we should be very proud to be among the first to chronicle such a discovery.—[Ed.]

ANOTHER PLATER'S PLAINT

To the Editor of The Metal Industry.

I have read with interest the article entitled "One Plater's Plaint,"* and being a plater myself of some twenty years' experience up and down country and in all classes of shops, mostly as a foreman, I can fully endorse every word of "A Plater." I have been placed in the some position as your correspondent states, namely, after having a green hand in the shop and teaching him sufficient of the trade to carry it on in my absence at any time, I have found that my job was always hanging in the balance and in one or two cases it has weighed down on the greenhand's side, not from experience, but cheapness. One very great fault in our trade and one that should be discouraged is the way firms who supply platers' materials have of imparting information to employers as regards the making and the working of solutions, a sort of "you buy our stuff and we will keep your solutions in order for you and you can then employ cheaper labor," to the detriment of the men who have perhaps studied hard for years and mastered every detail of the business, and also to the detriment of the boss, who soon begins to lose his connections, due to the bad and inexperienced labor.

Another setback to the experienced plater is the number of books on electroplating, and given a book, a little knowledge in the plating shop becomes very dangerous. I have had employers tell me that anyone could do plating from a book, and there lies one of the secrets of cheap labor. Technical schools again have had a lot to do as regards lowering the status of our trade by turning out, yearly, numbers of half-taught young men eager to chance their arm in some electroplating shop. I say "half taught," for in all my experiences I have never yet found a thoroughly qualified all-round metal finisher that came from a technical school. One more thing, Mr. Editor, and I have done, and that is, why cannot the insane practice of price cutting in our trade be stopped? Firms I have worked for have taken on work at a loss simply for the reason that the firm across the way should not have it. And who has to suffer for this in the long run? Why, the skilled employee, for low-priced work must and does mean scamped work and also cheap labor. Another thing that should be stopped is the employment of female labor, great quantities of which exist in and around Birmingham. I have tried my best to show the existing state of things in the trade, but hope someone more capable than I am will take this up with the result of making things a little better for us.

Another Plater.

Surrey, England, January 16, 1912.

*The Metal Industry, December, 1911.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—What is the cause of gun metal not coming out with a bright red color; also is there any instrument made to test the metal before taking it out of the pot to show that it is the correct temperature?

A.—The following mixture will give casting with a red color:

Copper	88
Tin	7
Zinc	4
Lead	1

There is no pyrometer on the market that is entirely satisfactory for ascertaining the temperature of molten brass. The Le Chatlier pyrometer is the best, but it has to be frequently calibrated and the quartz tubes soon go to pieces.—J. L. J.

Q.—We manufacture a valve for beer barrels which is subject at times to great heat and also to cold atmospheres. The alloy we use is known as a "zinc base" alloy, and in time turns nearly black. What we desire is a metal for the die-casting process that has strength, casts without blow holes, does not turn color and will not break when exposed to cold atmospheres. Can you give us a formula for such a metal?

A.—Parsons' white brass is the toughest die casting alloy we know of. It is a tin base metal, but contains zinc and this may render it unsuitable to your work. We would suggest the following alloy:

Copper	2
Antimony	15
Tin	83

J. L. J.

CURLING

Q.—Will you kindly inform me, through the Shop Problems, how "jiggering" is done; also what is the best nickel solution to use on malleable iron?

A.—The finish you refer to is termed "curling," and is usually applied to fine machined surfaces; also upon brass, largely upon camera parts, surveying instruments, etc. The method used to produce the finish is to use a vertical drill press, at a speed of 500 or more revolutions per minute. Hard wood or charcoal sticks made round of the size of the curling required, are placed in a chuck in the same manner as using a drill. Emery mixed with a little oil is used for the curling medium (No. 100 size down to flour emery may be used according to the fineness of the curl required). For brass finely powdered pumice stone and oil is used in the place of emery. Cork fitted into a steel shank in the place of using wood or charcoal sticks gives good results.

For a good nickel solution use the following:

Double nickel salts	8 ozs.
Single nickel salts	1 oz.
Sal Ammoniac	2 ozs.
Boracic Acid	3 ozs.
Water	1 gal.

C. H. P.

DIPPING

Q.—Will you let me know through the Shop Problems columns of a pickle or dip for German silver springs after being annealed?

A.—If you require a bright surface it will be necessary, after annealing and picking, to acid dip them. For this purpose give them a momentary dip in undiluted aqua fortis (38 per cent.) or dip in a solution of the following proportions:

Yellow Aqua Fortis, 38 per cent	1 gal.
Sulphuric Acid, 66 per cent	1 gal.
Water	1 qt.
Muriatic Acid	2 ozs.

Mix in the order given, then let the solution cool down before using. One or the other of these methods will give you a color almost equal to polishing. After acid dipping the articles should be thoroughly washed and dried before polishing.—C. H. P.

DRAWING

Q.—Can a copper wire be lightly coated with gold and then stand drawing down?

A.—Copper wire can be readily plated with gold and then redrawn. For practical results the operation should be made a continuous one as follows: (1) The cleansing tank—this need only be a warm cyanide of potassium solution which will remove the slight film of grease and oxide. (2) Cold water wash tank. (3) Gold depositing tank. (4) Cold water washing tank. (5) Tank with a warm soap solution for lubricating the wire, using fig soap, borax soap or whale oil soap in water. The cleansing and soap tanks can be of wrought iron; the gold bath and wash tanks should be of enamelled iron. Such tanks need not be more than three inches wide and four to six inches deep. Ball bearing rollers should be attached to each tank to overcome friction or stretching of the fine wire. At the exit end of the cleansing, wash, water and plating tanks the wire should pass through felt, so that the excess carried by the wire may be returned to each individual tank to avoid contamination of the baths. For drawing down the wire after gilding, diamond dies are used. Of course, any number of wires may be passed through the tanks at one time, providing all arrangements are properly made. The gilded wire produced in Lyons, France, is not a pure gold, but an alloy of gold and nickel approximately 18 karat. This alloy does not tarnish as readily as 22 karat gold and is considerably lighter in color than pure gold.—C. H. P.

DROSSING

Q.—We use considerable quantity of pig lead in making the upper dies for use in our drop presses, and accumulate a lot of dross during the year. We are endeavoring to learn the percentage of loss in melting lead. For instance, when we have 1,000 lbs. of lead dross, we would like to know how many pounds of lead have been required to form 1,000 lbs. of dross. We melt the lead in open pots or kettles, using natural gas for fuel, and skim off the dross as it accumulates.

A.—We are unable to give any definite or absolute information without more knowledge of the facts in the case. As is well known when lead is melted and brought in contact with the atmosphere "dross," or oxide is formed, due to the metal combing with the oxygen of the air. Unfortunately for the solution of this particular problem, lead forms two such oxides, one of which requires one molecule of oxygen for formation and the other two. These oxides are expressed in chemical nomenclature as PbO and PbO_2. A single pound of PbO will furnish .92822 pounds of lead and a single pound of PbO_2, will furnish .86604 pounds of lead.

From the above it will be readily seen that if it were known just how much of one form or other or both forms of oxide were produced when melting down a certain amount of lead, the exact loss could be figured, but as this is not the case, it

would be advisable to figure all oxide formed as PbO and use the factor .92822, were it not for the fact that another element enters into the problem. It will be found that the so-called lead dross is a combination of not only PbO and PbO_2, but also of minute kernels or pellets or metallic lead which have become coated with one of the above oxides, so this condition renders it practically impossible to say offhand how much lead will be required to form a given weight of lead dross.

The best way that this solution can be arrived at would be to take a fair sample of the lead dross produced, and assay it for lead content, then figure up that conditions during the melting of the lead are the same, and the percentage of lead found in the tested portion could be used as a standard.—L. J. K.

FINISHING

Q.—Can you tell me what finishes can be obtained upon builders' hardware by sand blasting, and what material is used to get the various effects? Is there a book that will give me this information?

A.—A great variety of hardware finishes are produced upon high and low brass, and also upon bronze mixtures, by the sand blast and the aid of solutions of sulphuret of potassium, using the strength of ¼ to 1 ounce to each gallon of water. Scratch brushing dry after the first immersion, and then giving a quick dip in a more dilute solution, then drying and lacquering produces a variety of tones. These finishes are termed sand antique, brass, copper and bronze. For sand antique copper it is necessary to copper plate the surface after sand blasting, then use the scratch brush as mentioned.

A number of greenish and other tones are produced in the same manner by immersing in warm or hot solution of the following:

Hyposulphite of soda	6 ozs.
Acetate of lead	3 ozs.
Water	1 gal.

or

Hyposulphite of soda	4 ozs.
Nitrate of iron	1 oz.
Water	1 gal.

After the finishes are produced they may be darkened in tone by using a dilute sulphuric acid solution, ½ ounce to each gallon of water, used cold; or a solution of 1 ounce of sulphate of copper in a gallon of water.

Such finishes are largely due to manipulation and the skill of the plater rather than to any given formula. The production of such finishes has reached a high standard in the United States. No book of information upon the subject has been published.—C. H. P.

GOLD PLATING

Q.—Kindly let a subscriber know how many gallons of gold solution a bath should contain to plate 64 square inches of surface; also at what hydrometer degrees should a good, rich gold bath measure?

A.—You do not state whether the 64 square inches of surface are in one piece or are a number of pieces approximating that amount of surface. If the surface should consist of one sheet with both sides exposed, 32 by 12 inches, then a bath holding 15 gallons of the following dimensions would be sufficient, 36 inches long, 6 inches wide and 16 inches deep. If the surface consists of a number of pieces, than a bath holding 15 gallons or less would answer the purpose. A good, rich gold bath should contain not less than ¼ ounce of pure gold per gallon and should stand at 2½ to 3 degrees Baume.—C. H. P.

PLATING

Q.—In plating silver our anodes become coated with a reddish brown or dark colored coating which is dissolved off by the solution in about a half hour, if allowed to hang with the current turned off. The anodes then present a bright appearance instead of the gray or crystalline effect, which we have always considered to be proper. In plating hollow-ware we find it necessary to use from 1 to 1¼ volts to overcome the reddish spots on the work, and this makes the deposit too hard. Can you suggest a remedy?

A.—The trouble you are experiencing may be due to several causes: (1) Insufficient amount of silver in solution which requires a higher voltage and greater amperage than with a solution richer in metal. In such a case the increased voltage causes a secondary reaction, producing a peroxide of silver at the anode. This is soluble in cyanide, but requires a larger amount of cyanide to reduce it than under normal conditions. We would suggest that you increase the metal content of your bath, adding at least one ounce of cyanide of silver to each gallon and see if your trouble will not be overcome. (2) The trouble may be due to impure anodes, and we suggest that you anneal the anodes if you find that the trouble continues. If, when you put in new anodes, the trouble still continues, then it may be traced to the cause stated above.—C. H. P.

Q.—Kindly publish a black nickel solution and also tell me what is the matter with my nickel solution; it works sooty and the black rubs off too easily?

A.—For a black nickel solution dissolve, first:

Double nickel salts	6 ozs.
Sal ammoniac	4 ozs.
Single nickel salt	1 oz.

in each gallon of hot water, and then add two ounces of sulphocyanide of potassium and allow the solution to cool. Second: Dissolve four ounces of carbonate of copper in eight ounces of strong ammonia. Add a teaspoonful of this to each gallon of the solution or a trifle more. Use anodes of sheet brass and a low current. This solution will give a good color. After using some time the anodes become coated with a basic salt, which should be removed by scouring or dipping.

Solutions made up from caustic soda and arsenic decompose rapidly and produce, after a time, sooty deposits, as noted by you. Your only remedy is to prepare a new bath. The customary proportions when using caustic soda is as follows: Dissolve in one gallon of hot water, one pound of caustic soda, then add two pounds powdered white arsenic. Allow to cool and add two ounces of cyanide of potassium. Use anodes of sheet brass.—C. H. P.

POLISHING

Q.—Will you please inform me why neatsfoot oil is put on leather-covered polishing wheels; also what can I use to wash these wheels to take the grease out of the leather, so the emery will hold?

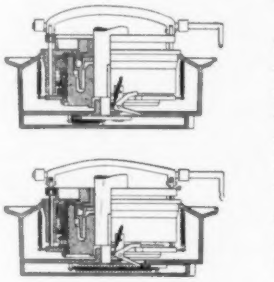
A.—Neatsfoot oil is the life of the leather. It is put on leather-covered wheels and compress leather and bullneck leather wheels when the leather becomes hard in order to soften it. It enters the pores of the leather and prevents it from becoming hard like a solid emery wheel, giving the wheel a new lease on life, as it were, just like oiling a piece of belting or a pair of shoes that have been water-soaked. The face of the leather on a wheel must be clean before applying the oil, and do not put on much oil at one time. The best way to apply it is to soak a piece of waste with oil and rub it all over the face of the wheel. Let it set over night or longer if possible—the longer the better—then sandpaper the face of the wheel before applying the glue for resetting.

There should not be any grease on the leather of the wheel at any time, for any reason whatsoever, except by carelessness on the part of the polisher. Wearing the wheel through while using it as an oil wheel, and then not taking it off at once, but continuing to use it, will not only allow grease to be absorbed by the leather, but also causes the latter to be worn uneven. Washing the wheel in the ordinary way on rollers and using warm water should clean the surface all right; then the wheel should be put in the spindle and while revolving cleaned off the face by holding a piece of sandpaper or emery cloth lightly against it. Should the leather be soaked with grease use gasoline for a cleaner, applying it with a plater's scrubbing brush and scrubbing until all traces of grease disappear. This will make the leather dry and hard and the wheel should be treated with a dose of neatsfoot oil, following the instructions given above.—T. C. F.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,008,950. November 14, 1911. Wire-Drawing Block. E. H. Carroll, Worcester, Mass., assignor to Morgan Construction Company, of Worcester, Mass.



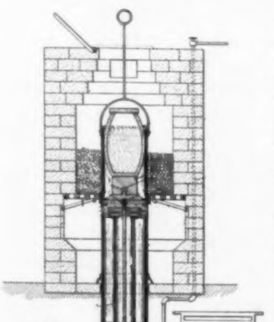
This invention has for its object to provide a wire-drawing block whereby a flexible connection between the rotating block and the wire gripping mechanism will be immediately drawn entirely within a shield or protecting rim upon the top of the block, whenever the strain upon the flexible connection is relieved, as by the breaking of the wire, thereby preventing the centrifugal movement of the flexible connection caused by the rotation of the block, and further to provide means for locking the flexible connection in an extended position to facilitate the application of the gripping mechanism to the wire to be drawn before the rotation of the block is begun. These objects are accomplished by the construction and arrangement of parts, as shown in the cut.

1,013,134. January 2, 1912. Process for Welding Copper. R. C. Davidson, Fort Blackmore, Va.

This invention relates to the art of welding copper and has for its object to provide a very simple and extremely efficient method or process whereby two pieces of copper of any form may be quickly welded together to produce what is, in effect, a single piece of metal.

The process consists in first placing the pieces to be welded together and inserting the same into a fire, then withdrawing the same after they have been heated and placing thereon at their meeting surfaces a quantity of borax, then again inserting the pieces into the fire to be heated and once more removing the same and hammering them together, then returning the pieces to be welded to the fire to be again heated, then removing them and placing upon the connected ends of the pieces a quantity of ferrous sulphate, then placing the pieces back in the fire until they are highly heated, and lastly removing the pieces from the fire and hammering them together to form the completed weld.

1,013,377. January 2, 1912. Hoist for Crucible Furnaces. L. H. J. De Bats, Zellinople, Pa. Assignor to A. G. Zehner, F. E. Zehner and J. C. Milleman, all of the same place.



The object of the invention is to provide a cheap, simple and efficient means, as shown in cut, for raising a crucible from a furnace, without gripping the same with tongs and without waiting for the coke to burn from around the same.

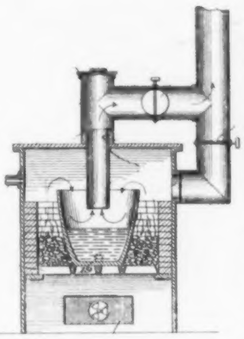
Two of the claims covering this device are as follows: A hoist for a crucible furnace comprising a block for fitting under the crucible to support the same, means connected to said block for raising the crucible from the furnace, a protective casing around said means and hung from said block, and a protective casing around said crucible and supported by the same, said last named casing having a handle extending up from the same.

In combination, a crucible furnace, a crucible, means for inserting and removing such crucible from such furnace, a casing surrounding the crucible during the insertion of the latter into the furnace, and means for thereafter removing such casing from about such crucible.

1,013,472. January 2, 1912. Crucible Furnace. G. E. Behrens, Torrington, Conn. Assignor to J. Veit, New York.

The furnace shown in cut is especially designed for melting metals in a crucible, being constructed to circulate a reducing or non-oxidizing gas over the surface of the metal in the crucible.

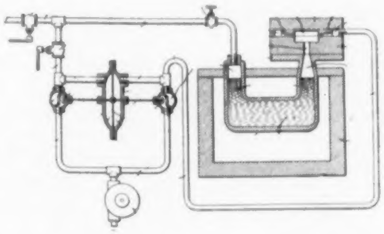
In operation, the crucible is charged with the metal to be melted and fuel is placed on the grate around it. The top and pipe are put in place, the door and lower damper are opened, and the upper damper is closed. The fuel is ignited and as soon as it is in active combustion the lower damper is closed and the upper damper is opened, whereupon the burning gases rising from the fuel pass inward over the edge of the crucible, thence downward over the metal therein, and finally upward through passages and into the draft-pipe, as indicated by the arrows. The metal is thus heated both indirectly by the heat conducted through the crucible and directly by the burning gases passing downward over its surface, and is soon melted. The gases entering the crucible, being of a reducing character and containing a considerable percentage of carbon monoxide, exclude air from the metal and effect reduction of any oxide rising to its surface. Hydrogen or other gases may be supplied to the furnace-chamber through a pipe, if desired. The operation may be watched through a peep-hole, and the molten metal may be stirred by removing the cover and inserting a rod. The molten metal may be tapped out through the opening, or if the furnace and crucible are small, the top, with its pipes, may be lifted off and the crucible then removed by tongs and tilted to discharge its contents.



1,013,548. January 2, 1912. Art of Making Castings. C. M. Grey, East Orange, N. J.

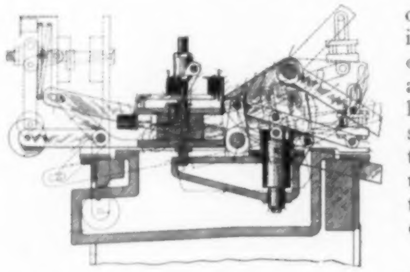
This is a process for the production of die castings which is not only simple and economical, but results in castings which are exceptionally solid, uniform and accurate, and entirely free from the defects heretofore existing in die castings.

With the specified objects in view, the invention, in one of its broadest aspects, embodies a method of controlling the flow of molten metal to the mold or die. This method consists in confining the metal in two chambers or compartments, as shown in cut, which communicate only beneath the surface of the metal, one of the chambers being connected with a die or mold space, producing a partial vacuum of the same degree in the two chambers whereby the metal is restrained from flowing toward the die, *i. e.*, retaining it in a balanced condition, and, when it is desired to cause the metal to flow into the die, changing the relative pressure in two chambers, preferably by increasing the pressure in the chamber not directly connected with the die, whereby the metal is forced into said die.



1,013,665. January 2, 1912. Die-Casting Apparatus. W. A. Leddell, Red Bank, N. J. Assignor to H. F. Merriam, Summit, N J.

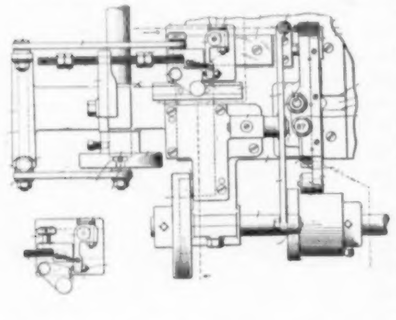
This invention relates to die-casting apparatus; and particularly to apparatus, as shown in cut, in which the various operations may be made entirely automatic. It has for its object ti simplify apparatus of this character, and to so construct the same that the various parts are readily accessible and removable; also, to so arrange the various mechanisms that all of the operations may be made entirely automatic. It has for its further object to prevent fouling of the outlet port of the casting pot; and, also, to automatically lock off the metal from said outlet port when the pressure exerted upon said metal has attained a predetermined degree.



The machine is covered among others by the following claim: In a die casting apparatus, a melting pot; a pivoted casting pot, within said melting pot, provided with an inlet port and an outlet port; upper and lower die plates and a die adapted to co-operate with said outlet port; means to revolve said die plates; means to lock the lower die plate when the said die plates have been revolved into casting position; means to tilt said casting pot; a fluid-controlling valve; and fluid actuated means controlled by said valve adapted to actuate said lower plate revolving mechanism, and the said mechanism to tilt said casting pot.

1,014,829. January 16, 1912. Wire-Feeding Mechanism. J. G. Lepper and W. W. Manville, Waterbury, Conn. Assignors to The Manville Brothers Company, Waterbury, Conn.

This invention relates to certain new and useful improvements in wire feeding mechanism. The invention has for its object the provision of improved means, as shown in cut, whereby the wire may be intermittently fed and cut in predetermined lengths. A further object is to provide means for varying the stroke of the feeding mechanism. A further object is to provide means whereby the machine may be adapted to operate on wires of different gage. A further object is to provide means whereby the feeding mechanism may be made temporarily inoperative. A further object is to provide feeding, holding, and cutting mechanisms arranged to act in time with each other, whereby the wire may be successfully advanced the desired distance, held and finally severed into the predetermined lengths.



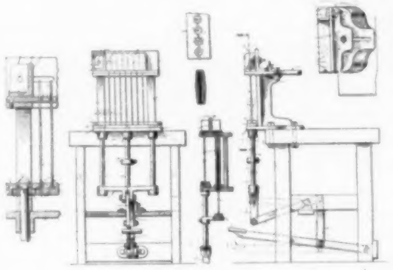
1,014,560. January 9, 1912. Process of Electroplating Aluminum and Its Alloys. Ernest Becker and Otto Becker, Tserlohn, Germany.

The present invention relates to an improved process of electroplating aluminum and its alloys with any desired metal, the improved process being such that the formation of an oxide film, or the application of an intermediate layer is avoided and a plating obtained which does not break or scale off even at a repeated bending of the plated material.

According to the invention the aluminum articles are first cleaned in a bath composed of cyanide of potassium, water and liquid ammonia, in the proportions of 50, 2,000 and 100 respectively. This bath is heated to boiling, and the articles are immersed in the boiling bath for 15 seconds whereupon they are transferred to a solution, composed of 3-5 parts tartar and 100 parts of water, to cool. This cleaning process is twice repeated, the immersion in the cyanide bath being, however, in the latter instances limited to the extent of 2 or 3 seconds. After the articles have been cleared of grease in this manner, they are transferred directly, without the application of an intermediate layer, to a metal bath of known composition, to which bath boric acid and ammonia may be added in known manner, whereupon the electroplating takes place in the usual fashion.

1,015,610. January 23, 1912. Machine for Venting and Wiring Cores. J. E. Borgen, Berwyn, Ill. Assignor of one-half to B. L. Zeller, Chicago, Ill.

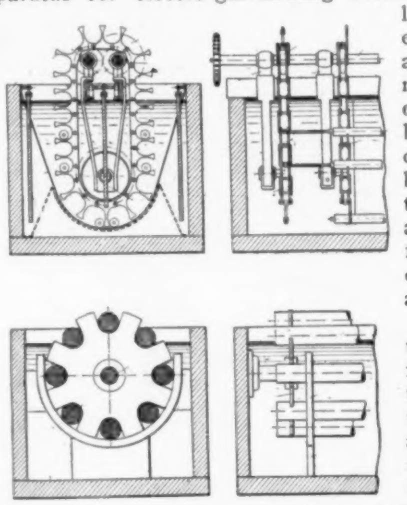
This invention relates to machines for operating upon cores for molds and more particularly the invention relates to a new and improved machine for venting and wiring cores. One of the objects of this invention is to provide a simple, practical and efficient machine, as shown in the cut, for making vents or air passages in cores and for inserting reinforcing wires therein.



In common practice a number of cores are molded at one time in a core box, and the core maker makes the vents therein by inserting a wire into each core and withdrawing the same. This operation is done while the cores are still in the box and considerable time is taken up in venting each individual core. When slender cores are used they are usually strengthened by means of a reinforcing wire which is inserted into the body of the core, and this is done by hand. The purpose of this machine is to vent a plurality of cores at once, or to wire a plurality of cores at once, thereby saving a great deal of time, labor and unnecessary work.

1,015,863. January 30, 1912. Apparatus for Galvanizing Metal Tubes, Rods and the Like. Federico Werth, Milan, Italy.

The specification of patent No. 970,149 describes an apparatus for electro-galvanizing metal tubes, rods and the like in which the holders or supports for the articles to be galvanized are arranged on endless rotating chains, bands or the like, the driving shafts of which being located outside the electrolytes. This application refers to further improvements of the said apparatus, as shown in cut.



It has been found, that the rings serving for the support of the tubes, rods or the like to be galvanized, may advantageously be constructed to be opened or open permanently as by this means the introduction of the tubes, rods or the like is greatly facilitated. To this purpose it would be sufficient to provide only a single chain or band with open rings, the tubes or the like being in this case firstly inserted in the closed rings of the other chain, whereafter in the open rings of the first named chain and at least the open rings closed and secured in some convenient manner.

1,014,946. January 16, 1912. Alloy for Coating with Metal. C. F. Burgess, Madison, Wis. Assignor to United States Sherardizing Company, New Castle, Pa.

1,015,913. January 30, 1912. Apparatus for Drawing Wire. J. Stratton, Altingham, and E. A. Claremont, Old Trafford, Manchester, England.

INDUSTRIAL

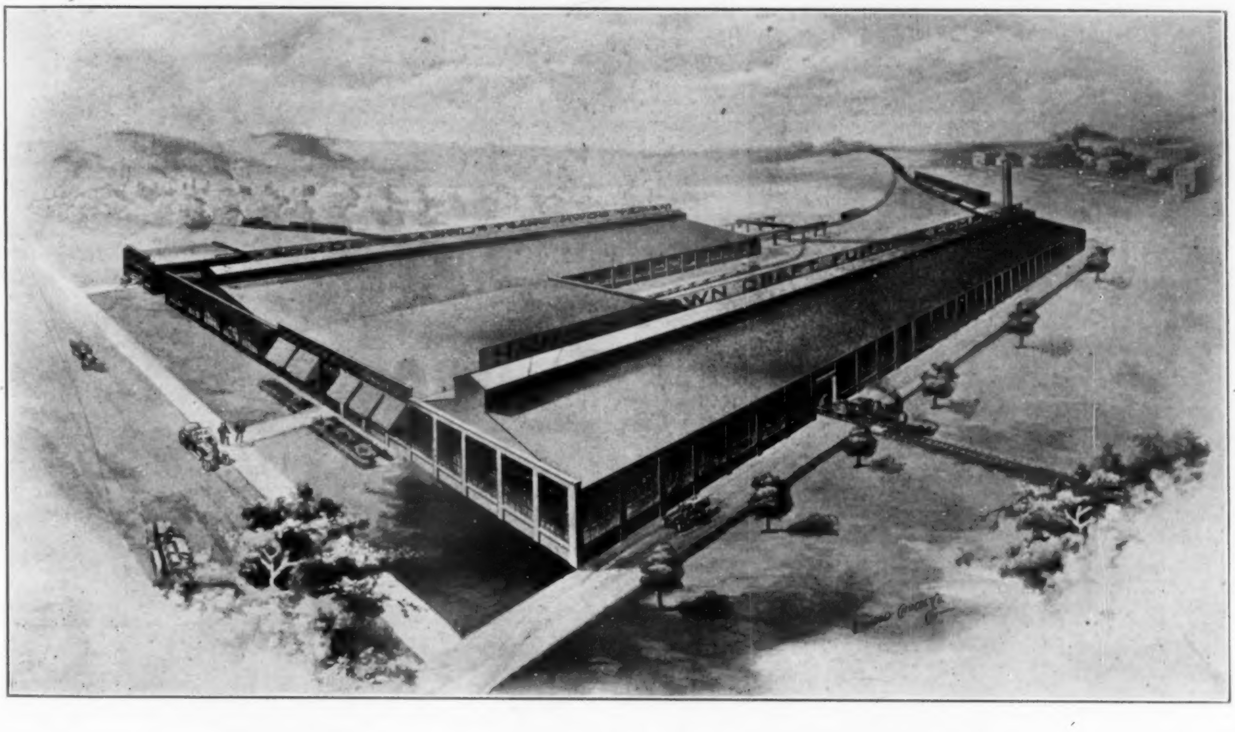
NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

NEW FURNACE PLANT

The Hawley Down-Draft Furnace Company are now comfortably settled in their new plant just erected at Easton, Pa. The move of the Hawley company to Easton from Chicago was viewed with regret by the business friends of the company in that city, but it is not surprising that the attractive offer made to the Hawley company by the enterprising Board of Trade of Easton proved too alluring to be rejected, when one considers the many advantages to be found in the new location. Easton is situated within a few miles of both Philadelphia and New York, and has ample transportation facilities, such as are afforded by four railroads, and also is in close proximity to large fuel and metal markets.

The new plant of the Hawley Down-Draft Furnace Company, as shown in the illustration, consists at present of three distinct buildings. One is designated as the machine and assembling shop, equipped with a ten-ton traveling crane, and has besides an industrial railway which runs completely around it inside, and a switch track to accommodate an engine and train of cars, to facilitate loading the products of the company under cover. The machine shop is 250 feet long by 175 feet wide, one story with, as shown by the picture, window lights wherever possible for them to be placed. The machine installation, such as planers, lathes, presses, etc., are arranged in groups, each one of which is capable of being operated by its own separate electric motor, thus enabling any one or all of the groups to be operated simultaneously or not, as the case may be.

Adjoining the assembling shop, which, by the way, contains in one end a complete steam plant for heating purposes, are the main offices which are divided into three separate units: The office and accounting rooms proper, with private offices on either side for the officials of the company, Col. C. E. Bleyer, president; Cliff M. Bleyer, general manager, and John J. Ryan, general superintendent. On the other side of the offices is the foundry, 200 by 60 feet, which is fitted up with Schwartz and pit furnaces and equipped with a most convenient and ingenious core oven designed by C. M. Bleyer. This core oven is built of reinforced concrete, is heated by oil, and consists of a frame or rack mounted on wheels and having attached to it at one end a large sheet of steel which constitutes the door of the oven. The frame itself is made up of racks into which are slid the steel trays containing the cores. When it is desired to get out a certain core or set of cores, the front door of the oven is pulled out the required distance, thus exposing the rack containing the desired core to view. The tray is then slid out from the rack, the core taken off, another one deposited if necessary and the rack pushed back into the oven. The foundry is also equipped with a five-ton crane. Another building for a steel foundry will soon be added to the plant, 250 by 150 feet.

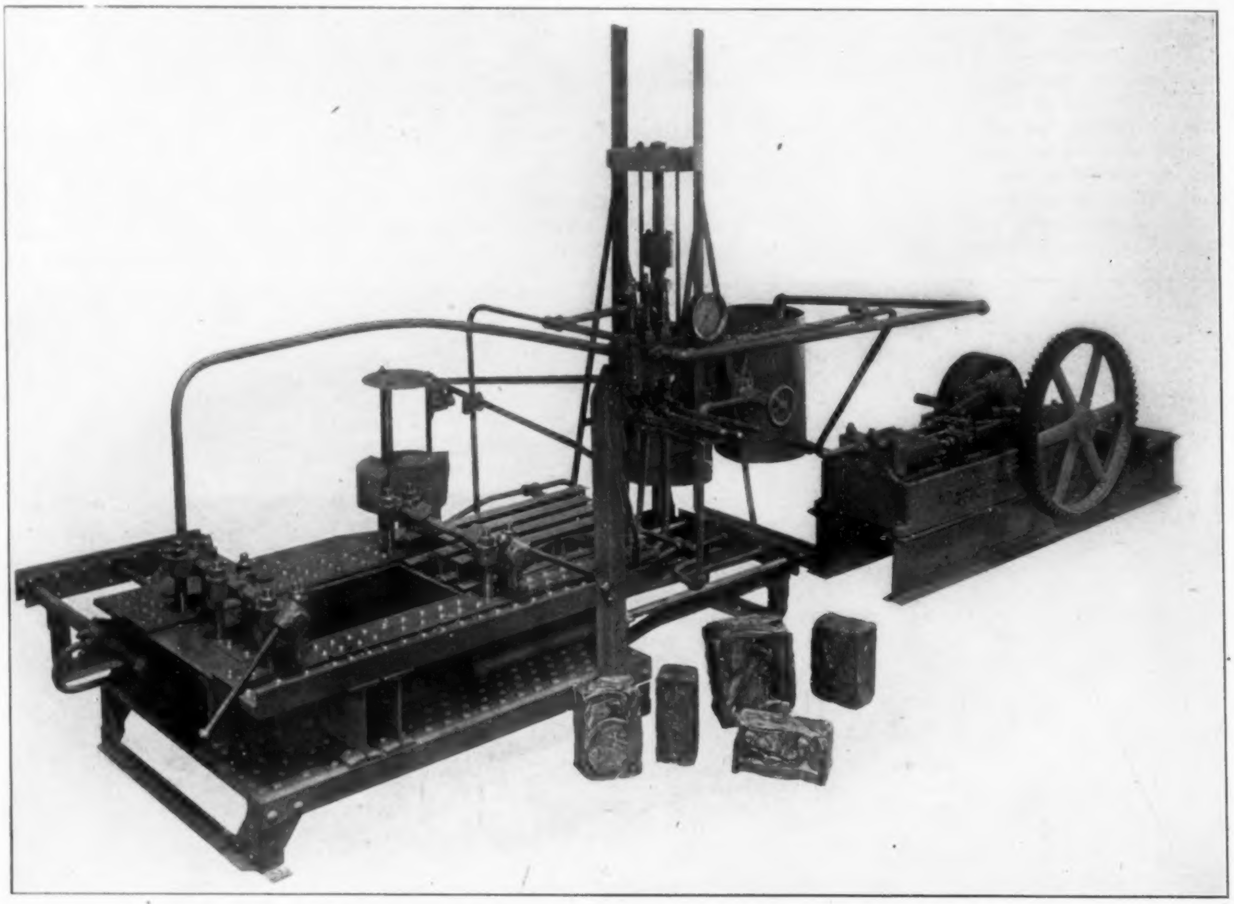


THE EASTON, PA., PLANT OF THE HAWLEY DOWN-DRAFT FURNACE COMPANY.

All of the buildings of this model plant are built of concrete reinforced steel construction and equipped with steel roofs. The whole plant has been so admirably arranged that the work of manufacturing the various products proceeds in a circle. Raw material enters at one end, so to speak, beginning at the foundries, here it is cast into shape and passes into the machine shop and assembling room. After the necessary operations have been performed the equipment is boxed or crated, loaded on cars right in the shop and starts on its journey. The Hawley company feel that they are now in a better position than ever before to supply the country at large with their products, which include the well-known Schwartz metal melting furnaces and the line of down-draft furnaces, which are used in the exploitation of the Hawley system of smokeless combustion. Catalogs fully describing all of these classes of furnaces will be cheerfully furnished upon request.

METAL BUNDLING MACHINE

We illustrate herewith a machine which has recently been placed on the market to more rapidly and efficiently bundle scrap metals. The function of the machine is not only to provide a satisfactory and economical method of handling scrap metals, but to considerably enhance their value by extremely solid compression. The machine which has been designed by the Logemann Brothers Company, Milwaukee, Wis., for this purpose operates with two distinct hydraulic rams of great power, so that from 100 to 400 tons pressure is exerted, depending upon the weight of the finished bundle, and the thickness of metal handled. It is claimed that scrap metal of all descriptions, whether it is to be melted into a furnace or crucible can be efficiently handled by these machines



THE LOGEMANN MACHINE FOR BUNDLING SCRAP METAL INTO CRUCIBLE SHAPE.

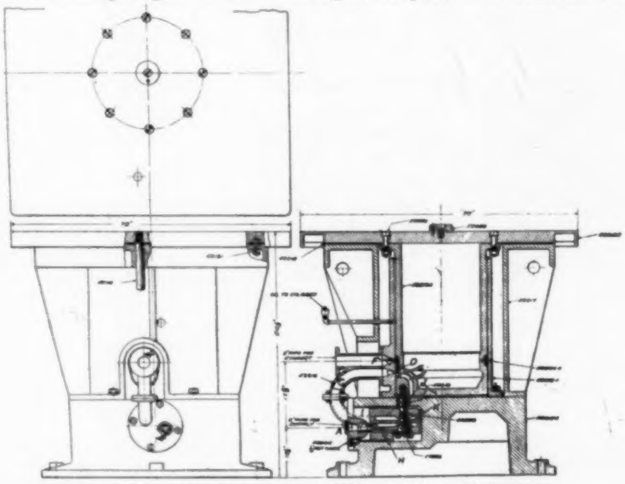
The machine consists essentially of a reinforced steel box of very heavy construction, into which the scrap to be compressed is placed, so it can be acted upon by the two hydraulic rams, arranged with their axes at 90 degrees. The compressing box is closed by a reinforced sliding cover when machine is in use. After the box has been filled with scrap, and the cover clamped tight, one of the rams known as the low pressure cylinder, compresses the material into a flat shape, whereupon the second ram operating at right angles finishes compression. This side thrust requires extremely high pressure so that the bundles are reduced to a density equalling about 40 per cent. of solid steel.

The machine herewith illustrated is of small size, suitable for crucible work, or to produce light bundles of sheet metal. These presses, however, are made in numerous sizes to produce finished bundles weighing from 20 pounds up to as high as 400 pounds each. By use of the two rams working at right angles, the scrap is entirely enmeshed and bound into a solid mass. It is fully equipped with automatic devices, so that unskilled labor may perform the work. The press, pump and hydraulic accumulators are all controlled by one operating valve, greatly simplifying the operation. For detailed particulars write Logemann Brothers Company, 282 Oregon street, Milwaukee, Wis.

NEW VALVE FOR JOLT RAMMERS

The new Mumford jolt ramming machine valve just placed upon the market by the Mumford Molding Machine Company, Plainfield, N. J., is claimed to be the simplest device of its kind manufactured and yet performs its functions perfectly. The operation of the valve will be understood from the following with reference to the sectional view of a 24-in. jolt ramming machine with table 72 x 72 ins. and capacity to ram molds weighing twelve tons.

Air entering at A passes around the stem of the valve B to the bent tube C. From this tube it enters the space in the side of the main plunger at D. Through the port E it reaches the



THE MUMFORD VALVE FOR JOLT RAMMERS.

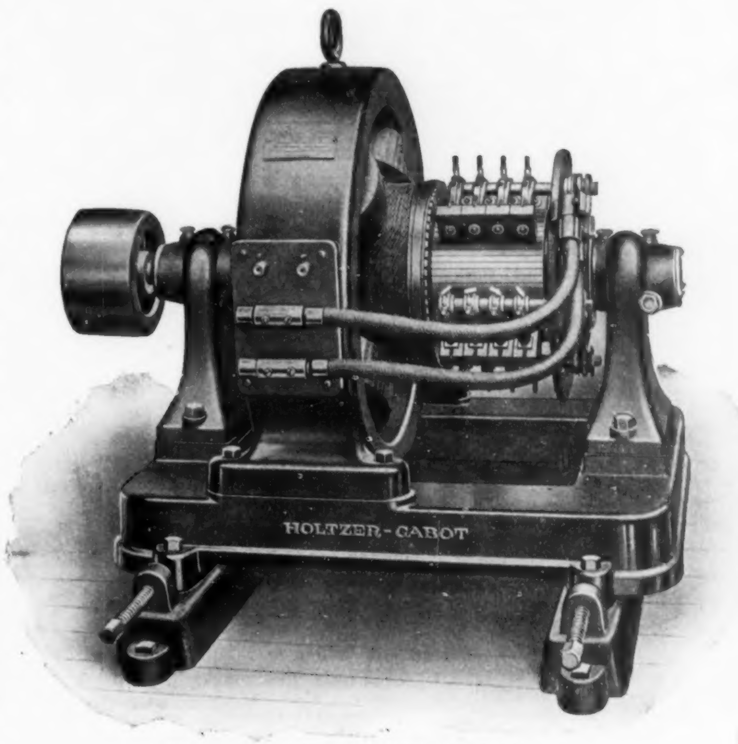
cylinder and raises the main plunger with its mold table. As the lower edge of the packing ring on the main plunger uncovers the exhaust port F, the rising shoulder G of the main plunger obstructs the entering air. Exhaust open and entering air blocked off, pressure falls rapidly under main plunger, and while table is falling to impact, valve B blows up into the reduced pressure in the cylinder and closes positively the entrance of air. The pressure which forces valve B up is line-pressure introduced through the by-pass H and this pressure holds B up, with air cut off, until, just before impact, the projecting part J of the main plunger forces valve B open and readmits air for the next blow.

Thus it is seen that the valve of this jolt ramming machine is unique in that it is actuated by the air independently of the velocity of the rising table, without imposing any burden upon the entering air column. In this it is differentiated from those valves which require that the machine shall have enough reserve capacity to send the table past a valve throwing point with velocity sufficient to complete the operation and not stall with valve partly thrown. It is for the above reason that these machines are giving higher capacities than machines with the other types of valves. The total absence of springs in the valves or anywhere else in these machines eliminates a constant source of trouble present wherever springs occur.

NEW PLATING DYNAMO

The Holtzer-Cabot plating dynamo here shown is a liberally designed, ruggedly constructed piece of appartus. The field frame is of cast steel with wrought iron pole pieces. There is a generous allowance of copper in the commutator, the bars being extremely thick; this is done for a two-fold purpose: In the event of wear by the brushes there is surplus metal to allow of truing the commutator, and there is also protection against frictional heat. To every manufacturer of plating dynamos, the heat question is a serious problem because of the fact that these dynamos of necessity require a large volume of current, with a low voltage. This machine has been built of open type construction to permit of free ventilation, thus eliminating the heat feature.

The commutator bars have ears on them, and the wire is soldered into the ears, allowing ventilation. The commutator is insulated with mica and is hand wound. The armature is large in diameter, giving plenty of room for the distribution of the windings and it is held in pedestal bearings. This method of construction makes it possible for an armature to be easily removed from the machine by removing one pedestal. The pedestals are accurately machined and will always be in true alignment when placed back on the machine, versus the end cap method of supporting an armature. The headboard is of slate with massive connectors and cable, thereby sustaining no



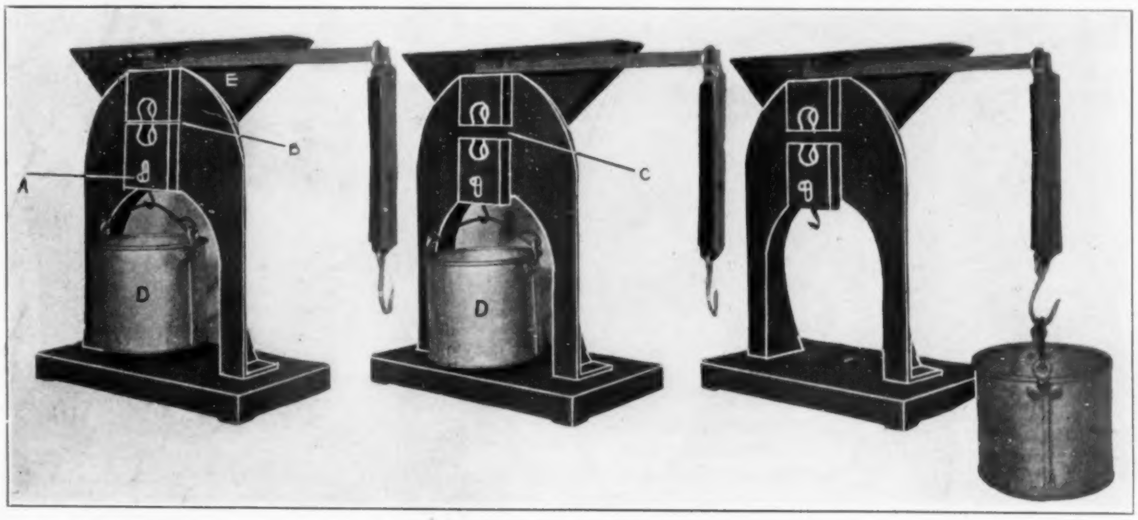
HOLTZER-CABOT PLATING DYNAMO.

loss in voltage. The fact that these are compound machines also insures a standard voltage from no load to full load.

The Holtzer-Cabot Electric Company, with offices in Boston, Mass., and Chicago, Ill., have been manufacturing plating dynamos for years, and make them in all capacities from 35 to 1,400 amperes at six volts.

A CORE TESTING MACHINE

After a number of years of experimenting in the testing of cores the new Wadsworth Core Testing Machine has been developed, as shown in the accompanying illustration. The core used, in the shape of the ordinary concrete briquette, having an area of 1 sq. in. in the center. The core is placed between the jaws when they occupy the position shown at the left, the jaws being closed together as shown at B. The illustration, however, does not show the core in place. The pail D is hung to the lower jaw so that it is supported by the core. The hopper E is filled with shot and by raising the pin A to the top of the slot in the jaw a small gate at the bottom of the shot hopper is opened and the shot allowed to flow into the



THE WADSWORTH CORE-TESTING MACHINE.

pail D. As soon as the weight of shot in the pail becomes sufficient the core breaks and the jaws separate as shown at C in the central view.

As the lower jaw descends it carries with it the pin A, thus automatically closing the shot valve. The jaw, however, is so arranged that the pail and jaw remain supported upon the pin A without coming in contact with the base of the machine. The pail is then lifted off and hung on the spring balances, as shown at the right of the illustration. To get the full weight which it took to break the core the lower jaw must be placed in the pail or a weight equivalent to the jaw must be placed in it. This gives a direct reading of the weight necessary to break the core. As soon as the reading is taken the pieces of the core are removed from the jaws, the shot poured back in the hopper, another core inserted, and the pail hung on once more, as shown at the left. The operation is very rapid, so that it is possible to test at least two cores per minute with ordinary mixtures.

The practical use of the machine is as follows: If it is desired to test a new lot of sand oil or binder, two batches of cores are made with the same sand, one using the old binder and the other the new, in the same ratio. These cores should be baked on the same plate in alternate rows. They are then taken out, allowed to cool and broken. The baking temperature will have considerable effect on the strength of the core, but it will affect both samples alike, so that with this method of procedure an exact comparison of the strength of the two binders is possible. It has been determined that variations in the clay content of the sand and the amount of dirt in the sand or in the shape and size of the sand grains themselves may have a marked effect on the strength of the core, and hence every new lot of sand should be tested as it comes in. To accomplish this, take samples of the new and old sand and make with them two lots of cores from a standard binder, as for instance, a sample of core oil kept for the purpose. These two sets of cores should be baked on the same plate and tested as already described. The machine is manufactured by the Wadsworth Core Machine and Equipment Company, Akron, Ohio.

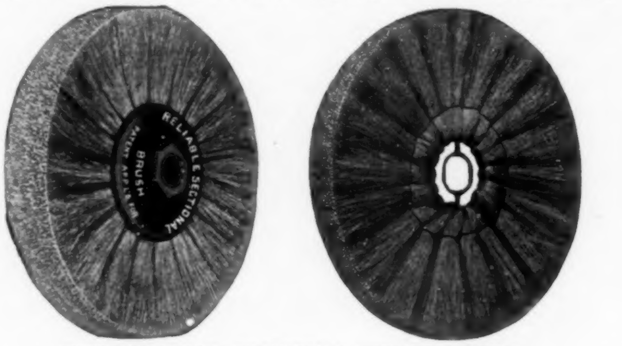
NEW TOOL GRINDER

NO. 8 TOOL GRINDER.

The tool grinder, shown in the accompanying illustration, is manufactured by the W. W. Oliver Manufacturing Company, Buffalo, and is known as their No. 8 Grinder. The distinctive feature of this grinder is the Hyatt roller bearing which, not only cushions the shocks, but presents a line of contact the full length of the bearing. It is in addition an oil reservoir and distributor; is self cleaning and requires oiling only at long intervals. The bearings of the grinder are moved through dust proof cups, and as these are sunk in the shell bearings, very little oil is necessary for perfect lubrication. By its use, the cost of operation is reduced to a minimum, and its long wearing qualities render this grinder a low priced article, yet high in quality. The guards are lightly constructed, yet heavy enough for protection, and conform with State factory laws. The spindle is made from machine steel, accurately ground and machined. The water pot is placed in a convenient location for the workman, resting on a suitable table for holding tools, etc. Complete specifications of this grinder are given in Bulletin No. 14, issued in January by the Oliver Company.

SECTIONAL WHEEL BRUSH

The Reliable Sectional Wheel Brush here shown, manufactured by the Newark Brush Company, of Newark, N. J., has many features which recommend it to the practical polisher. The brush is made in sections. These sections are put on a steel hub and held together with malleable iron



THE RELIABLE SECTIONAL WHEEL BRUSH.

flanges. Four sections will make a brush 12 ins. diameter with 2½-in. face. They can be worn down to the flange and can readily be interchanged or replaced.

This construction, it is claimed, makes a full, substantial brush which carries more polishing material and will give three times the wear of the ordinary brushes now on the market. Time and material can be saved by using it, and the safety of the operator is assured as there is no wooden block to split.

HOT BLAST TORCH

The Turner Brass Works, Sycamore, Ill., have designed and patented The Turner Hot Blast Tubular Gasoline Torch, No. 101, herewith illustrated. It produces an intensely hot blast flame, easily controlled by the gasoline valve, and the construction is such that it can be adapted to a large variety

THE TURNER HOT BLAST TORCH.

of work. This new torch is about 5 ft. long and made of heavy gauge brass tubing, 2 ins. in diameter, with a powerful burner at one end and gasoline valve and pressure pump at

the other end. The long tube contains the gasoline that is delivered to the burner, and holds about three quarts. A unique feature of this appliance is the controlling valve inside of tube, which regulates the flow of fuel in such a manner that the torch can be used in any position with the flame pointed up or down, as illustrated. Air pressure is pumped into the gasoline chamber the same as in any other torch by means of the pump at the end of the tube. The size of the flame is 2 ins. diameter at the burner and about 12 ins. long, and the torch weighs only about 7 lbs.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

During the past month THE METAL INDUSTRY had the pleasure of a call from two Russian engineers from Moscow—Paul Schimunek and A. Uschakun, who have been visiting American metal rolling mills.

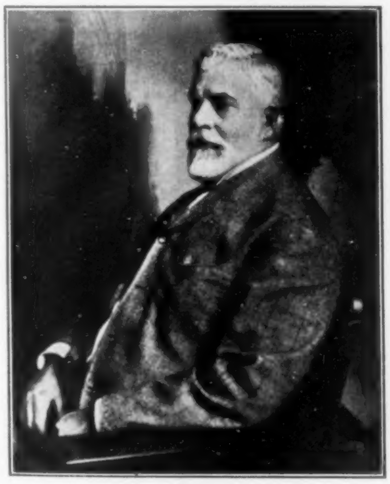
J. A. Cripps has become connected with the Canadian branch, Toronto, Ontario, of Crouse-Hinds Conduit Company, Syracuse, N. Y., and has full charge of the electro-galvanizing department. Mr. Cripps reports that the company anticipate building an extension to the plant in the spring, and will install a new 2,000 ampere Hanson & Van Winkle dynamo, together with tanks and other equipment.

William J. Coane, who is widely known in the foundry industry through his long connection with the Joseph Dixon Crucible Company, Jersey City, N. J., has now taken the office of third vice-president and general sales manager of The Ajax Metal Company, Philadelphia, Pa. Mr. Coane was manager of the Philadelphia plant of the Dixon company for twenty-five years. His associates in the latter company recently tendered him a complimentary dinner at the Hotel Majestic, upon which occasion he was presented with a solid silver loving cup.

The Associated Foundrymen of Chicago recently held a guessing contest in which all sorts of estimates and guesses were made on the strength, size, weight, of castings, etc. Prizes were given by firms and trade journals to the successful guessers. THE METAL INDUSTRY contest consisted of estimating the average strength of two cast bronze bars, which were shown before the assembly. The average strength of the two bars was 50,000 pounds, and the first prize was won by R. R. Biesemeir, who guessed 52,000 pounds. Second prize, H. A. Schroeder; third prize, E. M. Kinder. THE METAL INDUSTRY prizes consisted of the following: First prize, one year's subscription to THE METAL INDUSTRY and bound volume of 1910 and of 1911; second prize, one year's subscription and a bound volume of 1911; third prize, one year's subscription.

DEATHS

RICHARD T. CRANE



RICHARD T. CRANE.

Richard T. Crane, the president of the Crane Valve Company, died at his home in Chicago on January 8, as reported in the January issue of THE METAL INDUSTRY. Mr. Crane was a victim of heart disease and his death was very sudden. He was born in Paterson, N. J., May 15, 1832. From his father, who was a man possessed of unusual mechanical ability and ingenuity, he inherited a pronounced aptitude in the same direction. When he was fifteen years old Mr. Crane went to work in John Benson's brass shop in Brooklyn, where he spent two years each in the foundry and finishing departments.

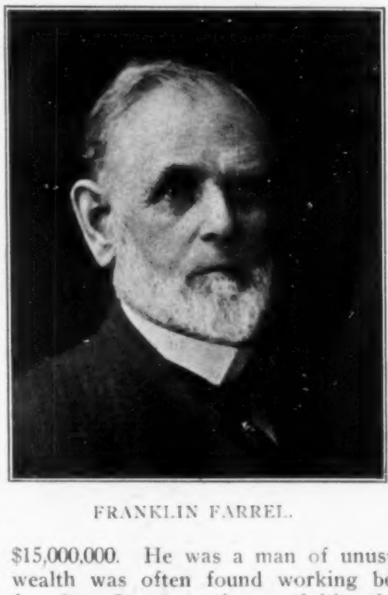
As a result of the business depression of 1854 he went to Chicago and opened a small brass shop, in the loft of which he lived, and from which has grown the Crane Company of today. One of the secrets of Mr. Crane's success was the fact that he familiarized himself with the mechanical features of the business, and was thus enabled to design labor-saving machinery and to bring out new lines of goods as the growth of the business demanded. By these means Mr. Crane was enabled to amass a fortune of nearly $20,000,000.

He always took an active interest in social, economic, political and educational affairs, and was especially noted for the interest he took in his employees, establishing a pension system for them. In 1892 he equipped a manual training school in Chicago, and every year provided scholarships in manual training for young men. In his later years Mr. Crane was especially noted for his attacks on colleges.

He is survived by his wife, three sons and four daughters, several of whom do not share in the distribution of his property.

His will provides a $1,000,000 pension fund for employees of the Crane Company. Another million is to be devoted to the establishment of homes near Chicago for widows and deserted wives. Small sums are also given to other charitable institutions. The bulk of his estate is inherited by his wife and his sons, Charles R. and Richard T. Crane, Jr.

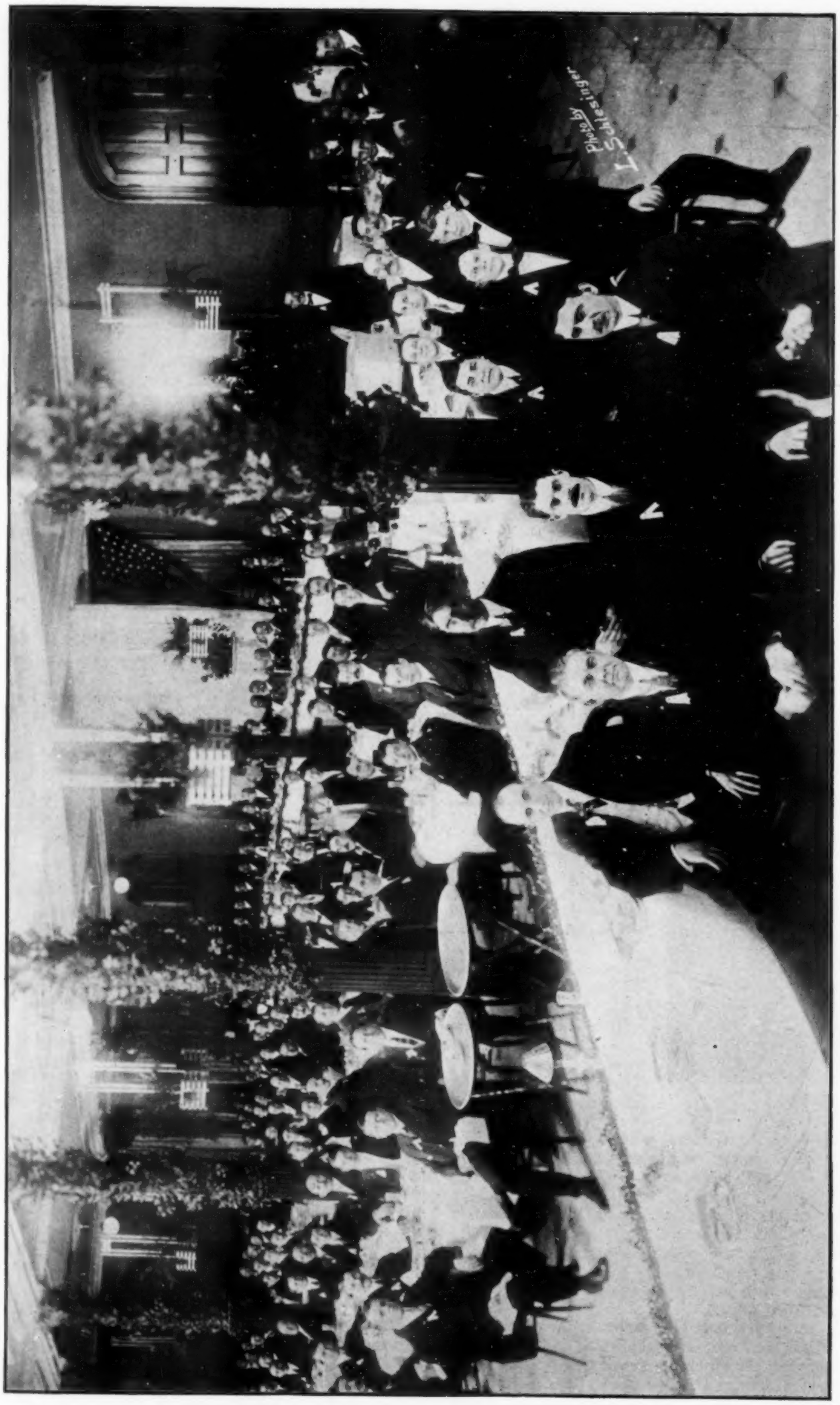
FRANKLIN FARREL



FRANKLIN FARREL.

Franklin Farrel, the subject of this sketch and president of the Farrel Foundry & Machine Company, Ansonia, Conn., died suddenly at his home in Ansonia on January 11, in his eighty-fourth year.

Mr. Farrel was born in Waterbury, Conn., and started his foundry in 1848 with twenty men, and it has grown steadily until today it is one of the largest in the country. In later years he also became interested in copper mines and sugar plantations, and at his death was reputed to be worth in the neighborhood of $15,000,000. He was a man of unusual energy, and despite his wealth was often found working beside his employees in the foundry. It was to these activities that Mr. Farrel attributed his good health, for he often said that as long as a man worked hard he kept young. He is survived by a son, Franklin Farrel, Jr., who was one of the mayors of Ansonia, and a daughter, Mrs. George A. Goss.



Third Annual Banquet of the National Electroplaters' Association of the United States and Canada, held at the Broadway Central Hotel, New York, February 10, 1912

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

THIRD ANNUAL BANQUET THE NATIONAL ELECTRO-PLATERS ASSOCIATION

The third annual dinner of the National Electro-Platers' Association of the United States and Canada (an educational society) was held on the evening of February 10 at the Broadway Central Hotel, New York and, like its predecessors, was an unqualified success. The attendance, as shown by the picture, was larger and more enthusiastic than at the dinners that have gone before. The speeches, several of which, either in whole or in part, are given in another part of this issue of THE METAL INDUSTRY, and were interesting and attentively listened to. The list of speakers included: Dr. Joseph W. Richards, secretary of the American Electrochemical Society; Dr. Max F. Weber, of the Roessler & Hasslacher Chemical Company; J. L. R. Brown, of the Handy & Harmon Company; Dr. Richard Moldenke, secretary of American Foundrymen's Association; Dr. William A. P. Jones, Celluloid Zapon Company.

The dinner was preceded by an all-day reception, held in one of the parlors of the hotel, where the visiting plater was greeted and made to feel at home by the reception committee, composed of members of the main body of the association, having its headquarters in New York. During the day several interesting industrial exhibits were shown, and were the centers of attraction.

Among the exhibits of apparatus for platers' and polishers' use, and of finished articles, were noted the following:

The Eureka Pneumatic Spray Company, 276 Spring street, New York, a display of various finishes produced by spraying pigments and lacquers with Epsco sprayers on brass, plaster and other materials. A nearly life-size plaster statue of the Venus de Milo, finished in antique verde bronze imitation was presented to the New York headquarters of the Platers' Association. A pair of the Bonheur models of lion and lioness, finished in ebony black with green relief, was given to the Philadelphia branch, and a handsome twenty-inch statue of "The Athlete," also finished in black on plaster, went to the newly formed Indianapolis branch. The Eureka company also donated souvenirs of verde antique finish on medallions in imitation of pennies of heroic sizes and small pin trays finished in imitation of ivory.

Rockhill & Vietor, New York, showed a model of their carboy rocker. Munning-Loeb Company, Matawan, N. J., catalogs of "Optimus" dynamos, distributed by George Chandler, the uniquitous New York representative. The Rojas Electro-Chemical Company, New York, a display of "Electro-Chroma" finishes by R. A. Rojas. The U. S. Electro-Galvanizing Company, Brooklyn, a working model of the continuous electro-galvanizing barrel by L. Potthoff, president, and sons. The Electric Storage Battery Company, Philadelphia, storage batteries. Antique finishes on brass by R. H. Sliter. Black nickel finishes by T. B. Haddow. Copper deposits one inch thick of pure copper, and copper on steel three-quarters of an inch in thickness by G. E. Moreland. Plating rack by the American Writing Machine Company, J. W. Demas, Newark, N. J. Nickel anode worn down so as to be flexible, by L. H. O'Donnell. Pigment finishes on brass, etc., by C. H. Proctor. Examples of damascening by electricty, by W. Johnson, New York. Air brushes and air compressors by The Vilbiss Manufacturing Company. Toledo, Ohio, represented by G. F. Haskins. Nickel deposit on zinc from a citrate of potassium solution, by J. F. Frost, Warwood, W. Va. Bright copper deposits by Royal F. Clark, New York, Bronze finish on brass, a section of a Lampson pneumatic tube cash system, by W. E. Symonds, Lowell, Mass.

The Sangamo Electric Company, Springfield, Ill., an ampere hour meter, represented by M. G. Chase. The Abbott Ball Company, Hartford, Conn., by A. H. and W. M. Briggs, 96 Reade street, New York, a large display of steel ball polished articles and a polishing barrel. Leiman Brothers, New York, a working model of a sand blast. A demonstration of voltite, by A. T. Firth and Holmes C. Walton. The Celluloid Zapon Company, New York, by Wm. A. Jones, samples of various finishes. This company also furnished the handsome menu cards for the banquet. The small lapel button given each visitor, member or guest on their arrival were furnished by the Egyptian Lacquer Manufacturing Company, represented by C. DeBaum and B. Popper. The whole exhibition was the result of the energetic engineering of B. B. Hogaboom, one of the most enthusiastic members of the association.

The list of those present, 182 in all, included the following:

Committee on Banquet—R. H. Sliter (chairman), John Painter, Thos. B. Haddow, Edward W. Faint, J. A. Stremel, Royal F. Clark, Frank P. Davis.

Committee on Reception—C. H. Buchanan (chairman), H. H. Smith, James Garde, Benjamin Popper, Chas. A. Stiehle, G. B. Hogaboom, H. C. Flanigan, Clinton De Baun, William Schneider.

Members and guests—Charles H. Proctor, Arlington, N. J.; Royal F. Clark, Jersey City, N. J.; Frederick C. Clement, Philadelphia, Pa.; Richard Sliter, Jersey City, N. J.; George B. Hogaboom, Newark, N. J.; George E. Irwin, Reading, Pa.; H. E. Dietrich, New York City; Roland Whitehurst, New York City; K. F. Potthoff, Brooklyn, N. Y.; A. H. Briggs, H. M. Briggs, Abbott Ball Company, New York City; E. L. Potthoff, United States Galvanizing Company, Brooklyn, N. Y.; G. E. Moreland, Pittsburgh, Pa.; C. Dittmar, Dr. M. Weber, Roessler-Hasslacher Company, New York City; W. J. Buckley, Wilmington, Del.; D. P. Arcutt, Electric Storage Battery Company, Philadelphia, Pa.; B. Popper, Egyptian Lacquer Company, New York City; Dr. William App Jones, Celluloid Zapon Company, New York City; J. W. Slattery, Norwich, Conn.; A. C. Plant, Brooklyn, N. Y.; C. W. Bailey, New Britain, Conn.; Theo. G. Hart, Baltimore, Md.; L. E. Sturdevant, Binghamton, N. Y.; G. H. Cartlidge, New Britain, Conn.; E. M. Stephenson, New York City; W. J. Turpenny, Chicago, Ill.; Edward C. Leiman, New York City; Louis Potthoff, United States Galvanizing Company; Thomas Trumbour, THE METAL INDUSTRY, New York City; E. Blasset, Jr., Bridgeport, Conn.; C. A. Hopkins, Brooklyn, N. Y.; W. Johnson, New York City; G. H. Niemeyer, Handy & Harman, Bridgeport, Conn.; H. H. Smith, Belleville, N. J.; George H. Chandler, New York City; H. J. Donnell, Newark, N. J.; L. H. O'Donnell, Jersey City, N. J.; F. P. Davis, Celluloid Zapon Company, New York City; W. J. Smart, Eureka Pneumatic Spray Company, New York City; M. B. Chase, Sangamo Electric Company, New York City; C. E. Dunn, Glastonbury, Conn.; J. M. Dunn, Bridgeport, Conn.; G. F. Haskins, The De Vilbiss Manufacturing Company, New York City; C. A. Stiehle, Irvington, N. J.; C. C. Mace, Newark, N. J.; Charles Peterson, Bloomfield, N. J.; Arthur B. Wells, Philadelphia, Pa.; William Muller, Newark, N. J.; A. T. Firth, manager Voltite Company, Aukland, New Zealand; H. C. Walton, Wallington, New Zealand; F. A. Hood, New York City; W. E. Symonds, Lowell, Mass.; William Fisher, New York City; Clinton De Baum, Egyptian Lacquer Manufacturing Company; C. H. Buchanan, C. U. Ely Company, New York City; William Keefe, Newark, N. J.; H. C. Flanigan, Celluloid Zapon Company; Arthur Russell, Rockhill-Victor Company; E. H. Hoppenstedt, Alward Manufacturing Company; William Voss, Brooklyn, N. Y.; J. W. De Mars, and J. H. Willmore, American Writing Machine Company, Newark, N. J.; W. C. Stratton, Bridgeport, Conn.; C. Wyrtzen, Bridgeport, Conn; E. R. Rottach, New York City; Hugh Baxter, East Orange, N. J.; W. H. Betz, Brooklyn, N. Y.; James Garde, Grantwood, N. J.; L. J. Krom, THE METAL INDUSTRY, New York; F. Rojas, New York City; L. J. Jacobs, Brooklyn, N. Y.; B. J. Owens, Newark, N. J.; A. K. Kendrick, Brooklyn, N. Y.; Emil Troxter, South Orange, N. J.; J. P. Arkem, Hanson, Van Winkle Company, Newark, N. J.; J. L. R. Brown, Handy & Harmon, Bridgeport, Conn.; R. A. Nock, East Orange, N. J.; S. H. Graves, Stamford, Conn.; J. A. Straub, Sr., New York City; J. A. Straub, Jr., New York City; F. Kilgon, Brooklyn, N. Y.; M. H. Smith, East Orange, N. J.; W. C. Gold, Philadelphia, Pa.; N. S. Emery, New York City; Dr. J. Feiner, Newark, N. J.; Edgar Proctor, Arlington, N. J.; William Schnieder, Brooklyn, N. Y.; H. R. Proctor, Arlington, N. J.; H. Noll, Arlington, N. J.; G. E. Osborne, Newark, N. J.; E. W. F. Faint, East Roselle, N. J.; E. S. Sperry, Bridgeport, Conn.; J. J. O'Connor, Orange, N. J.; J. B. McGrath, Newark, N. J.; Samuel Taylor, East Orange, N. J.; George Renter, Newark, N. J.; J. A. Wilson, International Smokeless Powder & Chemical Company, New York City; A. Back, Brooklyn, N. Y.; J. Minges, Brooklyn, N. Y.; .J Rausmaier, Brooklyn, N. Y.; ,H. Wohl, Brooklyn, N. Y.; F. W. Matts, Jr., Newark, N. J.; P. E. Hartmann, Newark, N. J.; George W. Cooper, THE METAL INDUSTRY, New York City; C. B. Leeser, Backus & Leeser, New York City; C. G. Backus, Backus & Leeser, New York City; W. J. Schmidt, Arlington, N. J.; Philo Newell, Waterbury, Conn.; W. B. Marks, Waterbury, Conn.; F. Duffy, Brooklyn, N. Y.; J. H. Hartnett, Newark, N. J.; J. Heim, Newark, N. J.; D. Schoonmaker, New York City; N. A. Barnard, Danbury, Conn.; A. J. Hopkinson, New York City; A. W. Baumler, Arlington, N. J.; S. D. Benoliel, International Chemical Company, Camden, N. J.; S. Masek, Bridgeport, Conn.; J. Lesko, Bridgeport, Conn.; H. C. Bernard, New Haven, Conn.; H. Creamer, New Haven, Conn.; F. Wanthey, Newark, N. J.; E. R. Taylor, Newark, N. J.; Dr. Joseph W. Richards, Lehigh University, South Bethlehem, Pa.; J. Fannon, Sr., Brooklyn, N. Y.; J. Fannon, Jr., Brooklyn, N. Y.; A. D. Havens, Ozone Park, L. I.; Dr. R. Moldenke, Watchung, N. J.; J. S. Phelps, East Orange, N. J.; C. Connelly, New York City; S. Schwerin, Newark, N. J.; J. Sanderson, Vulcanite Manufacturing Company, Lindenhurst, L. I.; George Forms, Lindenhurst, L. I.; Frank Brunell, Philadelphia, Pa.; L. Klein, Jr., Jersey City, N. J.; H. H. Reama, Brooklyn, N. Y.; William F. Clark, Bridgeport, Conn.; John Pointer, Brook-

lyn, N. Y.; G. Roberts, Bloomfield, N. J.; R. R. Webber, Montclair, N. J.; H. Vintiedt, Bloomfield, N. J.; R. Baldwin, Bloomfield, N. J.; T. F. Slattery, Bridgeport, Conn.; J. J. Sullivan, Norwich, Conn.; T. B. Haddow, Jersey City, N. J.; F. E. Moore, Brooklyn, N. Y.; L. B. Prahar, Brooklyn, N. Y.; A. M. Clark, Jewelers' Circular, New York City; F. F. Pertsch, Belleville, N. J.; S. S. Slater, Belleville, N. J.; E. Gazel, Belleville, N. J.; M. Donnelly, Belleville, N. J.; E. Schor, Passaic, N. J.; R. Stout, Irvington, N. J.; R. E. Sullivan, Newark, N. J.; Theodore Krender, Newark, N. J.; G. Gehling, Newark, N. J.; E. Millwater, Brooklyn, N. Y.; E. Lyding, Brooklyn, N. Y.; T. J. Noonan, Brooklyn, N. Y.; R. E. Massisotte, West New York, N. J.; William A. Bode, Rojas E. Chemical Company, New York City; Charles Cooper, Glendale, L. I.; Thomas Cooney, New York City; T. O'Brien, Newark, N. J.; H. Farrell, New York City; A. P. Munning, Munning-Loeb Company, New York City; J. J. Burke, Brooklyn, N. Y.; A. Leuchter, Brooklyn, N. Y.; A. Talamona, New York City; L. Lesch, Brooklyn, N. Y.; John Silver, Jersey City, N. J.; J. J. Ryan, Meriden, Conn.; D. Busch, Brooklyn, N. Y.; H. Friedman, Brooklyn, N. Y.; A. Weneth, Orange, N. J.

[Some of the above names may be mispelled. Owing to the lack of time we were unable to verify them. We apologize beforehand to anyone who fails to recognize himself.—Ed.]

The regular monthly meeting of the Philadelphia branch was held at Dooners Hotel, January 26. Applications were received for two associate and one active memberships. J. McBride read a paper on the Deposition of Metals on Metallic Substances, samples being exhibited. An open meeting will be held at the Windsor Hotel on the evening of February 21. Among the papers that will be read is one by Hugo Hermanns on Brass Solutions. All foremen platers, chemists and supply dealers are invited to attend this meeting.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

February 5, 1912.

With the close of the first month of the year, the metal manufacturing concerns of the Naugatuck Valley enter February with little change from conditions as they have been since early in December. Generally speaking business is not lively. The plants hereabouts are running on full time as a rule, but with less than the full complement of hands and in only a few instances is there any overtime or special night work. These are not bad conditions, nor yet particularly good, but the worst feature is that there is no certainty of any change for the better in the near future and on that account those inclined to pessimism are having plenty of opportunity to talk.

No one business, or department, seems to be affected, but all are running in the various branches of industry here at an ordinary speed and almost hesitatingly. It is in the variety of products that the metal industry finds its stronghold and this is proving true now, for where one department is very dull others are almost brisk and the manufacturers are taking advantage of the opportunity to stock up in lines that are at all depleted. Under these conditions it is the unskilled laborer who suffers most, and there is really little for any of this class of help, who are out of jobs, to work at.

One of the principal events of the month was the celebration, in a quiet way, of the fiftieth anniversary of Chauncey P. Goss' connection with the Scovill Manufacturing Company, which occurred on January 15. A full account of Mr. Goss' career is given on another page of this issue of The Metal Industry.

Considerable work on repairs and minor improvements are being made in many of the factories and they may all be said to be in first-class condition. At the Waterbury plant of the Plume and Atwood Manufacturing Company a ten-ton elevator is being installed by a Springfield firm, and when completed this will be one of the finest "lifts" in any shop hereabouts.

In Thomaston, Torrington and Winsted conditions are about the same, unless, perhaps, they are a trifle duller, but there seems to be enough work to keep good-sized forces busy five or six days each week.

Some feeling was expressed in Torrington over Andrew Carnegie's statement that no needles were made in this country, on account of the fact that needles are being turned out by millions from the needle shop of Torrington, for the sewing machine makers. Mr. Carnegie would find in the Torrington shop some truly wonderful needle machines and some skilled workmen.

Another little flurry hereabouts was caused by the printing of Washington despatches telling about the new metal schedule in the democratic tariff bill. This was represented as making such sweeping reductions that it would tend to seriously check the progress of Connecticut's great brass industries. No one here has seen the proposed metal schedules yet, but the more progressive manufacturers will probably exert every influence they can command to ward off any blow aimed at local industries. Up to date most of the debate in Congress seems to have been on the iron and steel schedules. These, of course, have considerable interest for manufacturers here on account of the great wire industry, but nothing very threatening has developed yet and it is doubtful if anything will. The watch movements which are listed in the bill are not such as would affect the cheap watch products of the Waterbury Clock Company (Ingersoll watches), but it is possible some of the rates on clock movements will be objected to here, as some of the finest clocks in the world are turned out here by this company. There are doubtless numerous products in the Scovill Manufacturing Company's, the Plume and Atwood Manufacturing Company's, New England Watch Company's, Randolph-Clowes Company's and the American Brass Company's catalogs which may be affected by any tinkering with the present tariff, as they are goods made in competition with products of England and Germany, and at narrow margins under the present tariff in many instances, but the general impression is that the manufacturers of this part of the country have their business so well studied out that they will be able to meet the situation safely. If they cannot it is safe to say that American industry as a whole cannot stand tariff regulation that will crush them, and will eventually prove a boomerang to its authors.

Since the last issue of The Metal Industry it has developed that the proposed new factory here to manufacture a new visible typewriter invented by Zahmon G. Sholes, has been sought by other cities, among them Bridgeport and Hartford. Mr. Sholes soon after the first of the year announced that unless a certain amount of stock was subscribed for in a week, the plan to locate in Waterbury would be abandoned. At the end of the week the subscriptions were not sufficient and the inventor and promoters went back to New York. The machine was exhibited here and made a favorable impression. It is a standard visible which the inventor believes can be produced at a profit for $50.

In our last letter it was stated that the headquarters of the Baird Machine Company were still in Oakville. The company has had its headquarters in Bridgeport for some time. It is rapidly completing the installation of its new machinery in the fine Stratford plant. There is much regret in some circles here that it found it necessary to leave this field in order to grow as it should.

Orders from outside are coming with slight evidence of increase in most lines and collections are only fair. There is plenty of money in the local banks to be had on comparatively easy terms, indicating no great demand from the manufacturers. When business booms here money tightens.

F. B. F.

NEW BRITAIN. CONN.

February 5, 1912.

The year that has just ended has been one of uniform prosperity for New Britain, its manufacturers, and the employees in the factories. With a population, growing in leaps and bounds, it is generally believed that this city will forge ahead rapidly within the next few years, and become one of the leading industrial centers of the world. Factories are building additions, made necessary by increased demands for their products, and prosperity should reign in New Britain in the year 1912 even it has in the year that closed recently. Of the fact that 1911 was a notable year in the history of local metal working concerns there is no doubt. During the twelve months the North & Judd Company has acquired two new factories; many minor, yet important business deals have been consummated, and the American Hardware merger, combining several factories and millions of dollars of capital, has been completed.

Charles M. Jarvis, president of the American Hardware Corporation, New Britain's largest concern which includes all the Corbin factories together with Russell & Erwin, says, "We can truly say that there has been a noticeable improvement in business during the past few weeks. The crop yield, the surest barometer of business activity, has been good, and under ordinary conditions should ensure reasonably active business for at least another six months if not for another year. I believe that the coming year will see the wheels of the factories here in New Britain revolving with the same rapidity and the same uniformity that has characterized our operations for the past ten years."—A. L. M.

PROVIDENCE, R. I.

February 5, 1912.

The Rex Manufacturing Company, a concern constituted to engage in the general manufacture and selling of jewelry, to be located in this city, with a capital stock of $50,000, has been granted a charter under the laws of the State of Rhode Island. The incorporators are Harry M. Burt and Lawrence McNary, both of Providence, and Albert U. Surprenant, of Woonsocket. One of the most important changes in the manufacturing jewelry industry of this vicinity in a long time was the announcement early in the month of the intention of the Bugbee & Niles Company, manufacturers of gold jewelry at North Attleboro, Mass., to remove to Providence the first of March. The company now occupies a portion of the Manufacturers' Building on Elm street, North Attleboro, but upon removing to this city it will be located in the A. T. Wall building on Clifford street. This action on the part of the Bugbee & Niles Company is of considerable interest here, as there are a number of manufacturing jewelers in the Attleboros that are doing business under charters granted by the State of Rhode Island and which are like the Bugbee & Niles Company paying a double tax. The manufacturing jewelry firm of Tuttle & Stark, 116 Chestnut street, this city, has been dissolved by mutual consent. J. Harry Tuttle having sold his interests to his partner, Asher A. Stark, who will continue the business alone. Lawrence F. Nolan has been appointed by the Superior Court as receiver for the manufacturing jewelry concern of Morgan & Zussman, 16 Fountain street. The receiver was appointed upon the petition of Harry Zussman, a member of the concern who asked the court to dissolve the copartnership. Claus Hanson, Edward J. Shadbolt and Joseph H. Coen, all of this city, have filed articles of association with J. Fred Parker, Secretary of State, incorporating the Hanson Manufacturing Company, to be located in this city. The capital stock is given as $15,000. According to the charter the concern is to engage in the manufacture and deal in jewelry, gold and silverware, precious and imitation stones. L. J. Aushen Company has been incorporated under the laws of the State of Rhode Island, and is to engage in the business of manufacturing jewelry in this city, and has a capital stock of $50,000. The incoporators are Louis J. Aushen, Isaac Dreayer and William W. Covill. W. H. M.

ATTLEBORO, MASS.

February 5, 1912.

It was stated that the G. K. Webster Company, employing 300, was to leave town, and in support of the story it was pointed out that Mr. Webster recently bought a valuable parcel of real estate in Providence. But developments proved that there was no truth in this Webster story, although the discussion following it early demonstrated that the manufacturers are dissatisfied with the methods of the North Attleboro assessors, who, they claim, are largely governed by politics. E. I. Richards, in a public letter, called attention to the fact that the town should consider the manufacturers as friends instead of enemies, even though they did not join in radical political movements and do not believe in the kind of revaluation the assessors are making.

Plans have been accepted for the construction of a new jewelry shop in Plainville which will replace the burned structure, and which will be big enough to employ 200 hands. Judge Byran, Judge Whittaker, of Wrentham, and F. A. Howard are the trustees to handle the funds which have been subscribed. Scofield, Melcher & Scofield and Maintien Bros. & Elliot have already signed leases for quarters in the new building, and it is expected that more firms will be ready by March 15, when the building is to be finished.

The old Sturdy jewelry factory in Chartley was burned out recently and the Cummings Manufacturing Company and the J. D. Gosselin Company met with heavy losses. An explosion of celluloid is blamed for the fire, which occurred at noontime and when the employes generally were out of the building. An old hand tub was used to fight the flames, and aid was summoned from Attleboro, but little could be done to check the fire. Sparks ignited the building nearby occupied by the Sturdy Manufacturing Company, Elliott & Douglas and Sturdy Brothers, but this building was saved. The total loss was set at $25,000. The owners have not yet announced their plans for rebuilding. The factory was 38 years old and was of brick and wood. On December 29, during a high wind, the brick walls of the ruins collapsed and several of the workmen engaged in the work of clearing up had narrow escapes.—C. W. D.

NEWARK, N. J.

February 5, 1912.

The past year's business has been one of fair proportions, while very few of the manufacturing jewelers made a great deal, but probably all or most of them made some money, although business was not up to the usual mark. While collections have been a little slow, there have not been any failures to speak of, and so conditions could be much worse. There are also quite a number of new firms starting in business every year, which cuts up the trade that much more, and it is harder for each one to make as much as they did before that. The coming year is expected to show some improvement over last year, as it seems to be necessary for the stores to buy and stock up more than they have been doing. Business has been held back so long now it would seem as if it should start in this year heavier, as there is no apparent reason for a slump anyway. Then again the fact that it is a presidential election year may work against this conclusion.

The great change in the trade this past year was the extraordinary demand for platinum made goods, such as rings, chains, La Vallieres, pendants, stick pins, earrings, bracelets, handy and bar pins. These come much higher in price, but they just suit the rich class, as a poor person cannot buy such goods. The medium grade, the 14 to 18 karat gold goods, to a certain extent have been cut out. There were two lines selling the 10 karat lines and the platinum lines. These are two extremes. A great deal of the platinum made goods were from special designs, and only one piece of that kind made, the die was then thrown away and destroyed. The demand for platinum will be still stronger this year, notwithstanding the continued high rise in price, as the metal is in the hands of a few. Diamonds are supposed to show off better with platinum than with gold, as loose diamonds are always shown on a white piece of paper, not on yellow, green or blue. There are many firms who did not make platinum goods last year who will get in line this year. While platinum costs more than gold, there is more waste to gold in working it up. While many of the manufacturing jewelers melt up their own gold, they cannot do so with platinum, but have to send that to a smelter.

The United States Pin Company have for two years made brass safety pins at Arlington, N. J., and sell to the jobbing trade. They also make paper clips and metal novelties. The

firm expect to move to another location, will enlarge the plant and increase the output.

The Trautz Company succeed the Wolff-Trautz Company, refiners and smelters. John B. Wolff has left the concern. Charles C. Trautz, Sr., is now president; August L. Trautz, secretary and treasurer.

L. E. Olney came to Newark from Providence and was with J. W. Rosenbaum. Now he has opened a well equipped shop for gold and silver plating at 613 Richardson building. H. S.

PHILADELPHIA, PA.

The Harrisburg (Pa.) Metalizing Company have helped to make the world's baseball series famous by making for general sale a bronze bust of Connie Mack, the manager of the Athletics.

The Bullion Refining Company assayers and smelters have opened an office at 732 Sansom street, in charge of William D. Bradley. The Sansom Street Business Men's Association, composed largely of manufacturing jewelers, held a meeting and are working hard to have better lighting facilities, more adequate police protection and cleaner streets for that section. D. V. Brown is president of the association and J. F. Neill secretary.

The Baltimore (Md.) Sterling Silver Buckle Company have taken the entire third floor of the building at 22 St. Paul street, have put in more machinery and put extra hands on. They are making 100 designs in buckles and silver novelties.

J. E. Caldwell Company made the Marlborough-Blenheim trophy for the motor boat races given under the auspices of the South Jersey Yacht Clubs at Stone Harbor, N. J.

Carl B. Gillespie, of Gillespie Bros., of Pittsburgh, Pa., has returned from a trip to Brazil, South America, where he went to inspect the diamond mines there. He was not very much impressed with the possibilities of diamond mining in those regions.

D. V. Brown, Alfred Humbert and J. S. Cooper represent the jewelers in a movement to have trade excursions, conventions in the interest of the manufacturing jewelers and silversmiths.—H. S.

BUFFALO, N. Y.

Manufacturing jewelers have had a fair year. Business with them has been just normal. There have been no failures and orders have kept at a healthy stage, with good prospects for the year to come. The last six months has seen a slightly increased demand for 14-karat goods. Silver and metal novelties have had a normal demand. Tool, machinery and material men have not suffered from lack of employment. The manufacturing jewelers found the year 1911 closing far better than they had anticipated when it opened. Probably no year has seen a larger demand for platinum, and its popularity with the public is likely to increase. Just now the salesmen are taking a well-earned rest, and the various ring manufactories are being overhauled, repaired and enlarged.

For the purpose of manufacturing musical instruments, a new firm has been organized which will occupy the building at North Tonawanda formerly occupied by the Von Rohl Musical Instrument Company, on Young street. The officers of the company are: President, E. A. Olley; secretary, W. H. Fullington, of Cleveland, and R. H. Olley, of Tonowanda, treasurer. The stockholders of the new firm, which will be known as the Monarch Musical Instrument Company, will open the plant on the 10th of January.

The Hebblewhite Manufacturing Company, of Gainsville, will soon be established in Buffalo. This concern manufactures polishes of all kinds, and will employ 150 hands. The plant and manufacturing rights have been purchased by B. F. Stinson & Co., 424 Niagara street. The J. H. Williams Drop Forge plant will remove its mammoth factories from Brooklyn to Buffalo. It will occupy 61 acres on O'Neil street, and employ 1,500 men, bringing 500 skilled workmen with them. S. E. B.

CLEVELAND, OHIO

FEBRUARY 5, 1912.

Metal manufactures and dealers in this city during the past month have been experiencing a fairly good line of trade, although there has been nothing sensational about it. Reports from the automobile factories indicate that there is going to be an unusual good demand for cars during the coming year. The manufacturers of accessories located in this city say that they are receiving many orders from other cities for automobile parts and accessories. Business is rather quiet with the manufacturers of plumbing goods in this city. The season for building is very dull just now owing to the cold weather of the past month, which was the coldest month in thirty-seven years in the history of Cleveland. It is expected that the plumbing business will brighten up considerably with the opening of the building season in a month or two.

Business is only fair with the various plating establishments throughout the city. It is believed, however, that the year 1912 is going to be a good one in most lines.

The announcement was made during the past month that the Kirk Manufacturing Company, Madison avenue and West 84th street, will double its capital stock to further the manufacturing of various metal products it engages in. The company has increased its stock from $150,000 to $350,000, and plans to greatly increase its capacity during the coming year.

The company, among other things, makes an extensive line of metal toys and juvenile automobiles. One of the interesting corporations in Ohio during the past month was that of the Anchor Brass and Aluminum Company, of Cincinnati. The corporation papers were secured for this company by Gustav A. Wendt. S. L. McM.

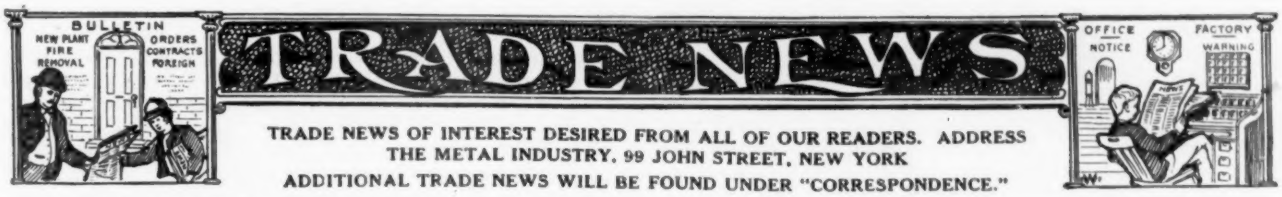
DETROIT, MICH.

FEBRUARY 5, 1912.

Brass and aluminum manufacturers in Detroit report as a rule a good run of business, with bright prospects of continued prosperity for some time. Ever since the first of the year business has begun to pick up in this branch of Detroit's industry. Manufacturers of plumbing goods particularly report business fine, with prospects for continued good conditions for some time to come. The same also comes from manufacturers of other brass and aluminum goods. The automobile industry, while it has been good all winter, is now beginning to boom in every department. The recent show held here and the national ones in New York and Chicago have greatly stimulated every automobile industry in Detroit and throughout the State. The fifty plants, as well as the numerous other accessory factories here, are now taking on new men and working to their fullest capacity. Hundreds of machines are being turned out each month, the Ford factory alone making strenuous efforts to manufacture during 1912 seventy-five thousand automobiles, the largest number ever undertaken by any plant in the world. A large new addition is now nearing completion that will greatly facilitate the work when the structure is ready for occupancy.

Herbert P. Carrow, secretary and treasurer of the Hayes Manufacturing Company of this city, makes the statement that it will only be a short time until all automobile bodies are built exclusively of aluminum or steel. The aluminum body, he says, never deteriorates, and it does not check as does a wooden body. It is easier for the painter to enamel, besides being safer and more rigid. Another great feature it has is that the opholstering can be buttoned right into the body and taken out when the owner wishes to clean the inside of the body. These are all important features that every owner of an automobile appreciates. E. E. Allyne, of Cleveland, while in Detroit recently, made the statement that the uses of aluminum have become so numerous that a great amount of the metal now is being consumed.

"Business conditions," he says, "impress me as being good because of the demand we are having for aluminum. The introduction of it into automobile bodies and other parts of the machine has opened up a big field, and we have many orders in this line. In the instance of the bodies of the cars it takes the place of wood owing to its great strength in proportion to its weight. Aluminum cooking utensils also are in great demand by all who can afford to equip their kitchens with this metal, which is light and easy to clean and altogether desirable. One of the comparatively late issues is in the hand forms which are used on glove counters. In other days were made of wood, but now they are cast in aluminum and this style is taking the place of wooden forms all over the country." F. J. H.



The Trenton Brass and Machine Company, of Trenton, N. J., are doing their usual large business.

Bardons & Oliver, builders of turret lathes, Cleveland, Ohio, are preparing plans for a smal addition to their plant.

The Lancaster (Pa.) Foundry Company have put in a nickel plating plant and have added several lines to their manufacturing business.

The Cox Brass Manufacturing Company, Albany,, N. Y., are erecting a three-story addition to their plant at N. Pearl and Van Woert street.

The Clark Novelty Company, Rochester, N. Y., which recently took over the plant of the American Draft Furnace Company, will erect a new brass foundry.

The National Electric Plating Works of Trenton have put in a new boiler, steam heating plant, a $500 nickel tub, and do refinishing in brass, nickel and oxydizing.

The A. H. Wells Company, manufacturers of seamless tubing for electrical purposes, Waterbury, Conn., expect, in the near future, to build an addition to their factory on the Watertown road.

The Art Brass and Fixture Manufacturing Company of McKees Rocks, Pa., with office in Pittsburgh, have built a new plant to make gas and electric fixtures, art brass specialties, and sheet metal goods.

The American Brass Company, Waterbury, Conn., through George E. Cole, assistant treasurer, deny that they are contemplating the erection of a new building as an addition to their present plant in Waterbury.

The Brass Products Company, manufacturers of illuminating fixtures, Southington, Conn., have recently enlarged their plant and are now in a position to take care of a much larger volume of business than in the past.

The J. D. Smith Foundry Supply Company, Cleveland, Ohio, are designing a new brass and aluminum foundry for Dodge Brothers, of Detroit, Mich., which will be one of the largest of its kind in the world.

Millett & Harley Company is the new firm name of the Millett Brass Company, manufacturers of brass, bronze, copper, aluminum and composition castings, Springfield, Mass. There has been no change in the management of the concern.

The Union Art Metal Works, conducted by Snedecker & Rue, at 171 Cooper street, Trenton, N. J., is a new concern. They are making gas fixtures and do brass, copper, nickel plating and later will put in a gold and silver plating plant. F. A. Peters is the superintendent.

Anyone now engaged in the plating business who is desirous of changing their location, or any one intending to enter this business, would do well to correspond with the Easton Board of Trade, through Charles A. Morrison, secretary, Easton, Pa.

The Brown Specialty Machinery Company, formerly at Jackson boulevard and Clinton street, Chicago, Ill., have moved to their new plant at Twenty-second and Campbell avenues, where they will be better able to take care of their extensive business.

The Sterling Brass Company, which was recently incorporated in Cleveland, Ohio, to manufacture a general line of plumbers' brass goods, has commenced the erection of a two-story brick and steel factory on Forty-seventh street, which will provide about 8,000 square feet of floor space.

At the annual meeting of the American Brass Company, held in Waterbury, Conn., February 6, Charles F. Brooker, of Ansonia, was re-elected president. Thomas B. Kent, of New York, was elected third vice-president in place of James S. Elton, and Franklyn E. Weaver, assistant secretary, replacing James A. Doughty.

The Cleveland Metal Products Company, Cleveland, Ohio, have drawn plans for the building of a new plant, which will double the capacity of their japanning department, and may also enlarge their metal pressing department. They have not yet decided when they will begin to make these improvements.

The Anderson Brass Company has recently been formed at Anderson, Ind., to manufacture brass and aluminum castings. The officers are: W. C. Hogwood, president; G. W. Hogwood, secretary; J. B. Harp, superintendent. Mr. Harp reports that their plant is completed and they are now ready for business.

At the annual meeting of The Wallingford Company, Inc., manufacturers of silverware, Wallingford, Conn., the following officers and directors were elected: C. W. Leavenworth, president; C. D. Morris, secretary and treasurer; Henry Norton, manager; C. W. Leavenworth, C. D. Morris, F. A. Wallace, H. L. Wallace and Henry Norton, Jr., directors.

C. E. Leffel, general superintendent of the plating department of The Spirella Company, manufacturers of corsets, stays and hose supporters, Niagara Falls, N. Y., reports that they are now building the finest equipped plating department in the world at the above city. They also have plating departments in England and Canada and expect to build one in Germany in the near future.

The Springfield Brass Foundry, manufacturers of brass castings, Springfield, Vermont, recently elected the following officers: E. T. Wood, president and general manager; F. B. Gill, secretary and treasurer; P. E. Luther, superintendent. Mr. Wood is a well-known brass founder of Lundonville, Vermont, and has acquired an interest in the Springfield company.

The Chattanooga Brass and Manufacturing Company, Chattanooga, Tenn., has recently been formed and has bought the Eagle Brass Works. The company will manufacture brass, bronze and aluminum castings and aluminum match plates. The officers are: P. S. Poindexter, president; E. H. Morris, vice-president and general manager; J. F. James, secretary and treasurer.

The Watson-Stillman Company, manufacturers of hydraulic machinery, with a plant at Aldine, N. J., and general offices at 50 Church street, New York, has been reorganized, owing to the growth of the company's business which necessitates an extension of their manufacturing facilities. The officers of the company are: Francis H. Stillman, president; E. A. Stillman, vice-president; J. P. Bird, treasurer; A. F.

Stillman, secretary and works manager, and Carl Wigtel, chief engineer.

The Bennett-O'Connell Company, manufacturers of platers' and polishers' supplies, Chicago, Ill., report that their business for the year of 1911 was 25 per cent. over any previous year since the company was organized, and the outlook for the present year is very promising now that they are located in their new factory with modern equipment for the manufacture of their products. They also state that the sale of their new type of plating dynamo increased over 100 per cent. during the past year.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., March 5, and publicly opened immediately thereafter, for furnishing the following supplies: At the navy yard, Mare Island, Cal., Sch. 4319, brass airports. Sch. 4322, bolts, stud, naval brass; buttons on plates, brass; hinges, T, bronze, screws, brass machines; screws, brass, wood. Sch. 4324, pipe, steam, galvanized. Sch. 4325, bolts and nuts, naval brass; cocks, brass bibs polished.

On account of the rapid growth of business the Remington Typewriter Company have found it necessary to separate the polishing and plating departments of their plant at Ilion, N. Y., which have been under the charge of Theodore H. Schesch, who is known as a contributor to the columns of THE METAL INDUSTRY. Philip P. Baker, who has been connected with the company for twenty years, has been appointed foreman plater to take charge of the new department, while the polishing department will remain in charge of Mr. Schesch.

At the annual meeting of the Excelsior Brass Works, Reading, Pa., held January 20, the following officers were elected: President, H. E. Woodward; vice-president, A. L. Frame; treasurer, Henry Etheridge; secretary and superintendent of factory, Louis H. Gantert. The report of the business for 1911 was very satisfactory, being the largest in the history of the company. The semi-annual dividend of 3 per cent. was declared. The company have a large number of orders on hand at present, and expect to begin the erection of an addition to their plant as soon as the weather opens up.

A new firm has been formed to be known as the National Metallizing Company, with a factory at Garwood, N. J., office at 1482 Broadway, New York. E. W. Robinson is general manager; Sigmund Lorentz, superintendent and J. Burt Gildersleeve & Company, sales agents. The Garwood factory is 200 feet long by 75 feet wide, located on the main line of the Jersey Central Railroad, and is equipped with every modern appliance for the performance of high-class metallizing work. The substances to be metallized are plaster, terra cotta, wood, stone, concrete, etc., which are used in the manufacture of gas and electric fixtures, architectural materials, art objects, etc. Advertising signs will also be a feature of the company's work.

The Onondaga Brass Company, manufacturers of brass, bronze, aluminum and silver metal castings, Syracuse, N. Y., announce, through L. F. Meagley, secretary and general manager, that they are now located in their new factory on East Water street. This plant, which cost $12,000, is built of concrete block and is equipped with a complete machine shop and pattern room, and the company will hereafter make all their own finished work complete. The company say that their facilities for producing work have been doubled by the building of the new plant and by the installation of their new machinery. The officers of the company are: President, Henry Mahley, vice-president and superintendent of plant, J. Underdown; secretary and general manager, L. F. Meagley.

The Genessee Metal Company, Rochester, N. Y., announce several improvements for the beginning of the new year. They have just installed a complete laboratory, which places them in a position to furnish, when required, a chemical analysis with all purchases of material. They will be glad to hear from any one interested in furnishing supplies for analytical chemists. Another improvement of the company's is a rarefied system for cleaning by-products, which system was installed by the American Boiler Company, Detroit, Mich.

The company report that the outlook for business in 1912 is very promising, they having booked a number of orders and secured several contracts for future delivery.

The Michigan Smelting & Refining Company, Detroit, Mich., have about completed their magnificent new building. They are fast installing the necessary equipment for the operation of the most modern and up-to-date smelting installation in the United States. A large contract has just been closed with the Rockwell Furnace Company of New York, which includes the following: A copper reducing furnace, 12½ tons capacity; a lead and a tin dross smelting furnace, and a sweating furnace suitable for the treatment of lead and tin compounds. All of these last three furnaces are of 2½ tons capacity. The new building is 308.4 feet long by 192.6 feet wide, and will be fully equipped with all the modern appliances necessary for the operation of an up-to-date smelting and refining plant. The plant was designed by Albert J. Hall, metallurgist of the company.

The sales force of The Benedict Manufacturing Company, manufacturers of silver plated ware and metal goods, Syracuse, N. Y., had a most enjoyable banquet at the Yates Hotel in Syracuse on the evening of January 3. Those attending the banquet were: H. L. Benedict, president; Geo. N. Crouse, vice-president; Chas. Van Wagner, secretary; R. B. Roantree, treasurer; A. F. Saunders, designer; M. H. Jackson, Los Angeles, Cal.; John Bailey, Pittsburgh, Pa.; F. A. Weatherley, Des Moines, Iowa; Newton Owen, St. Louis, Mo.; O. D. Irwin, Boston, Mass.; L. G. Proctor, Vancouver, B. C.; J. L. Leslie, Trenton, N. J.; J. H. R. Proctor, Toronto; A. C. Barrie, San Francisco; J. F. Kane, Syracuse, N. Y.; J. P. Deal, Atlanta, Ga.; W. A. Van Patten, Columbus, Ohio; Ed Dorner, New York City; E. O. Vermilyea, St. Paul, Minn.; W. H. Upright, Detroit, Mich.; E. E. Fuller, New Orleans, La.; S. R. King, Dallas, Tex.

The Zucker & Levett & Loeb Company, manufacturers and dealers in nickel and electroplaters' supplies, polishing materials, etc., have opened an office at 132 Nassau street, New York, and report through a circular just issued that business is going along very nicely, and they are now equipped to promptly take care of all business given them. The circular states also that the company now has associated with it men who are merchants of high standing, with a wide experience in the chemical, paint and kindred lines. The company will have the benefit of their wide experience, and also of ample financial support. They are manufacturing their heavy goods, such as compositions, in both Cleveland and Chicago, which enables them to supply the trade in that vicinity very promptly, and without the burden of the heavy freight rates between New York and those points. The business is now being conducted on very conservative lines, and the company anticipates a slow healthy growth. The formulas, trademarks, patents, etc., of the old company are being adhered to, and it is the aim of the company to keep the quality of all of their products up to the very highest standing.

The Osborn Manufacturing Company, Cleveland, Ohio, which on January 1 took over the plant and business of the Colonial Brush & Manufacturing Company of Wilwaukee, Wis., has sent out circulars to the old Colonial trade announcing that all business from the Colonial territory will be handled from the Cleveland headquarters, 5401 Hamilton avenue. The Colonial plant will continue to operate with a full force, and to facilitate the supplying of the different Osborn lines to the trade in the Colonial territory, merely it has been decided to handle such business from the office and factory. It was announced that should Colonial customers for a time find it more convenient to order by the same numbers which have been used in their dealings with the old Colonial company, the orders can be so handled. Hereafter, the Milwaukee plant will be known as the "Colonial Works." E. F. Streich will continue as resident manager. Trade in the western territory, however, will continue to be handled through the H. A. Potter Company, San Francisco, Pacific Coast selling agents. Neither will the territory of the Cleveland Osborn Manufacturing Company, 202 Centre street, New York, be disturbed.

FINANCIAL

The Indian Aluminum Company, Limited, Madras, India, have issued their twelfth annual report and balance sheet under date of October 27. This report shows that a dividend of 12 per cent. was paid for the past year, and that the company is in a flourishing condition. They have issued some fresh capital and their total capitalization is now $250,000. They have built some new large shops and installed an electric drive. Among their new machinery are three drawing presses and forty additional spinning lathes. One of the drawing presses is capable of turning out about a ton of aluminum shapers per day.

REMOVALS

The Philadelphia office of the Aluminum Company of America has been moved to 1119 North American Building.

The general office and post office address of the Buckeye Aluminum Company, manufacturers of "real solid" aluminum cooking utensils, formerly of Doylestown and Wooster, Ohio, is now Wooster, Wayne County, Ohio.

Kirk & Blum, manufacturers of hoods for polishing wheels, and blow pipe, Cincinnati, recently moved into their new home at Western avenue and York street. They have been doing a nice business heretofore in their Economy hoods, but in their new plant have better facilities for handling orders. The new building is 38 x 165 feet, with a 22-foot ceiling, and with a basement under the whole building, with a ceiling of 10½ feet.

It is reported that A. Klipstein & Company, now at 129 Pearl street, New York, have leased a new 8-story building at Greenwich and Barrow streets, New York, and that they will shortly occupy the entire structure. Since 1871 A. Klipstein & Company have carried on an immence business as importers of chemicals, gums, etc. Among other specialties they handle Caustic Potash, Sal Ammoniac, Prussiate of Soda and Potash, Zinc Ammonium Chloride and Barium Chloride. The company maintains branches at Boston, Philadelphia, Chicago and Providence.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

THE KELLY BRASS WORKS, Chicago. Capital stock, $20,000. To carry on a general brass manufacturing business. Incorporators: P. S. Kelly, T. F. Kelly and J. E. Kelly, all of Chicago.

BROWN'S ENAMEL WORKS, INC., Fitchburg, Mass. To manufacture and deal in enamels. Directors: Fred E. Hill, Fred P. Butman, Louis E. Flye, all of Holbrook, Mass.

PRINTED MATTER

METALS AND ALLOYS.—C. W. Leavitt & Co., New York, have issued a calendar which is embellished by a handsome halftone engraving in a brown tone, showing a 15-ton electric furnace. This firm is headquarters for antimony, magnesium metal and ferro alloys.

CRUCIBLES.—The crucible department of the Joseph Dixon Crucible Company, Jersey City, N. J., has issued a new circular, giving information regarding their standard sizes of crucibles—with accurate and up-to-date dimensions. The Dixon tilting furnace crucibles are also described in the circular, which will be mailed upon request.

BAIRD MACHINERY: The Baird Machine Company, Bridgeport, Conn., issue a bulletin known as the "Baird Master Bulletin, November, 1911," which gives a complete list of the wire-forming machinery, tool and die grinders, foot and power presses, eyelet machines, sheet scrap metal reels, oblique tumbling steam drying horizontal grinding and steel ball burnishing barrels. All of these interesting installations are described in Bulletin No. 399, to be had upon request.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at THE METAL INDUSTRY office, 99 John street, New York. THE METAL INDUSTRY is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

AD NEWS

The Slade Manufacturing Company, Providence, R. I., have a card calling attention to their brass and copper tubing. They specialize in small sizes.

M. M. Audler & Company, Boston, Mass., announce that they are dealers in all kinds of metals and buyers of skimmings, grindings, drosses, filings, brass foundry ashes and all kinds of scrap metals.

C. B. Slade, Providence, R. I., is advertising a new belt lacing which is made of a special alloy of metals that has been fully tested during the past three years. It is stated that this belt lacing will last three times as long as regular lace leather or other wire belt lacing.

R. McKellar's Sons Company, Peekskill, N. Y., are advertising in this issue their powdered and granulated charcoal, foundry facings, charcoal facings, parting compounds and general foundry supplies. This company was established in 1844, and their products are well known to the old-time foundry trade.

The United States Chemical Company, 3621 Lakeside avenue, N. E., Cleveland, Ohio, are advertising Perfection Grease, a lubricant for plumbers' brass shut-off cocks and similar goods. They state that they have been making this material for a number of years and it has given such good satisfaction that they have decided to extend its sale through advertising. They claim that this grease does not set or get hard after being applied to the brass goods, but that its qualities improve with age.

D. B. Moyer, formerly of Walled Lake, Mich., and well known to the plating trade, has formed a partnership and opened headquarters under the name of Moyer & Gulbrandson, 69 Buhl Building, Detroit, Mich. The new firm is engaged in the manufacture and jobbing of dynamos, nickel anodes, nickel salts, shot nickel, cotton buffs, felt wheels, potash, lye, acids, roto-platers, compositions, in fact, a full line of plating, polishing and buffing supplies. Mr. Gulbrandson was formerly treasurer of the Dover Manufacturing Company, Canal Dover, Ohio, and Mr. Moyer has been connected with the plating supply trade for many years.

J. W. Force, electro-chemist, New Britain, Conn., advertises on another page that he will supply the formula at a reasonable cost, for producing electro-deposition bronze effects, such as verde antique, patinas, statuary bronze greens, yellows, French grays and different colored smuts on backgrounds of gold, silver, nickel, or any other metal body. The solution in the hands of any plater with a fair knowledge of the deposition of metals can be so manipulated as to produce some very handsome effects. The process, or in fact any electro-colored bronze solution, is not adapted for use on very small cheap articles. Mr. Force states that he produced this solution several years ago while experimenting for a black dip oxidize on nickel plate. Mr. Force has had 45 years' experience in the electro-deposition of metals and the making of lacquers, gold dyes and chemicals required in connection with this business.

METAL MARKET REVIEW

New York, February 8, 1912.

COPPER.

The advance in the prices of copper which started last December was carried well into January when the market reached 14½ cents for Lake, 14⅜ for Electrolytic and 14¼ for casting brands. At the close of the month prices are about ¼ cent per pound below the highest. The foreign market has been more or less disappointing and the declines in Wall street have probably affected domestic consumers, and buyers have not been as keen as a few weeks back, and with an easier tone to the market buyers seem more inclined to hold off.

Statistically the metal is in good shape, the exports during the month total 30,967 tons against 29,357 tons for the same month last year. According to the foreign statistics the total visible supply in England and France decreased 1,700 tons during January, and compared with a year ago the total visible supply has decreased 28,220 tons or over 63,000,000 pounds. The market closes today with Lake obtainable at 14¼, Electrolytic, 14 cents and casting brands at 13¾.

TIN.

The London market is about £1 lower than a month ago, with spot standard, £61 17*s.* 6*d.*

With everything figured out for a January squeeze of the shorts, the price of the metal dropped from 44½ cents at the opening to 42⅜ and reacted later to close to 44 cents at the end of the month. All the private and confidential information given out regarding the exact doings of the London syndicate for the last two or three months has been more or less misleading and unreliable.

Statistically the metal is about the same as a month ago. The American consumption is estimated at 3,700 tons, which is fairly good for January.

The market closes today at 44¼ cents for spot tin to 42¾ for March delivery.

LEAD.

The lead trust at the end of January lowered the price of lead 15 points, making the market 4.30 New York delivery. During early February the Trust further lowered the price, bringing New York delivery to 4 cents, making a total decline of close to ½ cent per pound in the space of one week. This arbitrary action of the Trust is pretty plain evidence of the complete control of the lead market by the Trust.

The proposed reduction in duty is probably the cause of this manipulation of the lead market, the effect will probably be to reduce the price of lead ores and by this means bring home to the mine owners the cost to them of the reduction in duty. It is a clever move on the part of the lead Trust, but it is to be hoped this unjust tax on the consumers of lead will be reduced.

The market today is unsettled at around 4 cents for New York delivery, and 3.85 cents at St. Louis.

SPELTER.

The spelter market is getting firmer again, and holders of the metal are talking scarcity once more. Prices have been advanced 15 points during the month, and stand a good chance of being pushed up another 15 points; the unsettled lead market may tend to stop the advance for a time. New York delivery is quoted today at 6.60, and East St. Louis delivery at 6.45.

ALUMINUM.

The market for aluminum has been dull, and prices are about the same as a month ago. Spot is quotable at 18½ cents, while futures, in round lots, are obtainable at 18¼ cents in ingots 98-99 per cent. pure.

ANTIMONY.

The market is very dull, and prices have given way about ¼ cent per pound. Cooksons is quotable at 7¼, Halletts is scarce at 7½, and Chinese is 6.80 to 6.85.

SILVER.

The price of silver during the month has advanced about 4 cents per ounce, and looks as if it would go higher. Closing at 58¼ cents in New York and 26¾ *d.* in London. Today the market is up to 59⅞ New York and 27 9/16 London.

QUICKSILVER.

The market for quicksilver is rather firmer, and the price has been advanced to $44.50 per flask wholesale. Jobbing lots $45 to $45.50.

SHEET METALS.

There has been no further advance in sheet copper or brass. Sheet copper is quoted at 19 cents base, wire at 15¼, high sheet brass 15⅝, seamless copper tubing 21 cents, seamless brass tubing 18 cents base.

OLD METALS.

The market was good and active as long as copper was advancing, but with the easier tone to copper the old metal market became dull and more or less unsettled.

J. J. A.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)
February 8, 1912.

Stocks of marketable copper of all kinds on hand at all points in the United States, January 1, 1912		89,454,695
Production of marketable copper in the United States from all domestic and foreign sources during January, 1912		119,337,753
		208,792,448
Deliveries:		
For domestic consumption	62,343,901	
For export	80,167,904	
		142,511,805
Stocks of marketable copper of all kinds on hand at all points in the United States, February 1, 1912		66,280,643
Stocks decreased during the month of January		23,174,052

JANUARY MOVEMENTS IN METALS

Copper.	Highest.	Lowest.	Average.
Lake	14.50	14.25	14.35
Electrolytic	14.40	14.00	14.25
Casting	14.20	13.20	13.70
Tin	44.50	42.35	43.40
Lead	4.50	4.25	4.45
Spelter	6.60	6.40	6.50
Antimony (Hallett's)	7.70	7.50	7.60
Silver	.58¼	.54¼	56.215

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.:

1911—Average for year 12¾. 1912—January, 14½.

DAILY METAL PRICES

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the back advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds. See Want Ad. pages.

Metal Prices, February 13, 1912

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	14.25
Electrolytic, carload lots	14.00
Casting, carload lots	13.75
TIN—Duty Free.	
Straits of Malacca, carload lots	44.00
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅝c. per lb.	
Pig lead, carload lots	4.00
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western, carload lots	6.60
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	25.00
100 lb. lots	19.50
Ton lots	18.25
ANTIMONY—Duty 1½c. per lb.	
Cookson's cask lots, nominal	7.25
Hallett's cask lots	7.50
Chinese	6.85
Hungarian grade	6.85
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots, Blocks according to quantity .43 to	.60
MANGANESE METAL—Duty 20 per cent	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad val	.98
QUICKSILVER—Duty 7c. per lb	.65
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	46.25
SILVER—Duty free	.58¼

OLD METALS.

Dealers' Buying Prices. Cents per 2 lb.		Dealers' Selling Prices. Cents per lb.
12.00 to 12.25	Heavy Cut Copper	13.00 to 13.25
11.75 to 12.00	Copper Wire	12.75 to 13.00
10.50 to 10.75	Light Copper	11.75 to 12.00
10.25 to 10.50	Heavy Mach. Comp	11.25 to 11.50
8.00 to 8.25	Heavy Brass	9.00 to 9.25
6.00 to 6.25	Light Brass	7.00 to 7.25
7.75 to 8.00	No. 1 Yellow Brass Turnings	8.25 to 8.50
9.00 to 9.50	No. 1 Comp. Turnings	10.00 to 10.25
3.50 to ——	Heavy Lead	—— to 3.75
4.75 to ——	Zinc Scrap	—— to 5.25
5.00 to 5.50	Scrap Aluminum, turnings	6.00 to 7.50
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 17.50
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

INGOT METALS.

		Price per lb. Cents.
Silicon Copper, 20%	according to quantity	28 to 30
Silicon Copper, 30% guaranteed	" "	30 to 32
Phosphor Copper, guaranteed 10%	" "	22 to 25
Phosphor Copper, guaranteed 15%	" "	24 to 27
Manganese Copper, 30%	" "	24 to 27
Phosphor Tin, guaranteed 5%	" "	54 to 56
Brass Ingot, Yellow	" "	10⅜ to 10¾
Brass Ingot, Red	" "	12 to 13
Bronze Ingot	" "	13 to 13⅜
Manganese Bronze	" "	17½ to 19
Phosphor Bronze	" "	13 to 16
Casting Aluminum Alloys	" "	17⅜ to 18⅝

PHOSPHORUS—Duty 18c. per lb.
According to quantity .... 30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 19.00 Cents. per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 30 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add .... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add .... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness .... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness .... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅝ inch diameter or over .... Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 1⅝c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	8 less 8%
Casks, jobbers' prices	8¾
Open casks, jobbers' prices	9¼

Metal Prices, February 13, 1912

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect January 11, 1912, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¾	$0.16⅝	$0.17⅞
Wire	.14½	.16⅝	.17⅞
Rod	.14⅛	.17⅛	.18⅞
Brazed tubing	.19⅜	——	.22⅝
Open seam tubing	.18⅛	——	.20⅝
Angles and channels, plain	.18¼	——	.20⅝

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass... ½c. per lb. net advance
" —Best spring, drawing and spinning brass.... 1½c. " " " "
Wire —Extra spring and brazing wire.............. ½c. " " " "
" —Best spring and brazing wire............... 1c. " " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16	$0.17⅞	$0.19⅛
Wire	.15¾	.17⅞	.19⅛
Rod	.15⅜	.18⅜	.20⅛
Brazed tubing	.20⅝	——	.23⅞
Open seam tubing	.19⅜	——	.21⅞
Angles and channels, plain	.19½	——	.21⅞

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass... ½c. per lb. net advance
" —Best spring, drawing and spinning brass.... 1½c. " " " "
Wire —Extra spring and brazing wire.............. ½c. " " " "
" —Best spring and brazing wire............... 1c. " " " "

BARE COPPER WIRE—CARLOAD LOTS.

15.75 per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order........................ 18½c. per lb. base
100 lbs. to 300 lbs. in one order........................ 19c. " " "
Less than 100 lbs. in one order........................ 20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubin, 21c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1⅛ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 50-5%.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod.. 17c. net base
Muntz or Yellow Metal Sheathing (14" x 48")................. 15½c. " "
" " " Rectangular sheets other than Sheathing 17½c. " "
" " " Rod .... 15½c. " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 24c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than........ and including.....	3in. 12in. in coils.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
No. 13 and heavier	34	34	36	36	36	36	39	39	39
" 14	34	34	36	36	36	36	39	39	39
" 15	34	34	36	36	36	36	39	39	39
" 16	34	34	36	36	36	36	39	39	39
" 17	34	34	36	36	36	36	39	39	39
" 18	34	34	36	36	36	36	39	39	42
" 19	34	34	36	36	36	36	39	40	43
" 20	34	36	36	36	36	38	41	42	44
" 21	34	38	38	38	38	40	43	44	50
" 22	34	38	38	38	40	40	43	47	51
" 23	34	38	38	38	40	40	43	49	52
" 24	34	38	40	42	42	42	45	51	54
" 25	36	39	41	43	43	43	46	53	57
" 26	36	39	42	46	46	46	51	55	61
" 27	36	40	44	48	48	49	54	58	64
" 28	36	40	46	48	49	49	56	62	67
" 29	38	41	48	50	52	52	61	67	72
" 30	38	42	50	52	56	62	69	72	77
" 31	43	47	55	58	63	71	74	77	83
" 32	45	49	57	61	69	77	91	90	95
" 33	47	51	60	65	73	84	91	100	110
" 34	50	55	62	70	78	91	103	110	120
" 35	..	65	70	80	90	100	115	125	..
" 36	..	80	90	100	115	120	135	..	..
" 37	..	104	114	129	144	159	174	..	..
" 38	..	124	139	154	169	184	204	..	..
" 39	..	144	164	184	204	224	..	..	..
" 40	..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.

Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	57
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4 per cent. to No. 19, B. & S. Gauge, inclusive	$0.60
6 " " 19, " " "	.70
9 " " 19, " " "	.85
12 " " 19, " " "	1.00
15 " " 19, " " "	1.15
16 " " 19, " " "	1.20
18 " " 19, " " "	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.